*United States Court of Appeals*

*for the*

*District of Columbia Circuit*

# TRANSCRIPT OF RECORD

FOR MR. JUSTICE GRONER

# TRANSCRIPT OF RECORD

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## Court of Appeals of the District of Columbia

APRIL TERM, 1933

361

## No. 5939

WGN, INC., APPELLANT,

*vs.*

FEDERAL RADIO COMMISSION.

APPEAL FROM THE FEDERAL RADIO COMMISSION.

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**FILED APRIL 13, 1933.**

**PRINTED AUGUST 15, 1933.**

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# Court of Appeals of the District of Columbia

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No. 5939.

WGN, Inc., Appellant,

vs.

Federal Radio Commission.

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1 In the Court of Appeals of the District of Columbia.

No. 5939.

WGN, Inc., Appellant,

vs.

Federal Radio Commission, Appellee.

## *Notice of Appeal.*

Now comes WGN, Inc., an Illinois corporation, and says that it is aggrieved and its interests are adversely affected by a decision of the Federal Radio Commission rendered and effective March 24, 1933, granting a modification of license to WBBM Broadcasting Corporation (WBBM) and to KFAB Broadcasting Company (KFAB) which decision in substance granted additional hours of operation to Broadcasting Station WBBM, located at Chicago, Illinois, and operating part time on 770 kc. with power of 25 kw.

Wherefore, WGN, Inc., hereby gives notice of its appeal from said decision and assigns in support thereof, the reasons hereinafter set forth.

## *Reasons for Appeal.*

1. Appellant owns and operates Broadcasting Station WGN located at Chicago, Illinois, operating full time on 720 kc. with power of 25 kw.

2. The Commission's decision aggrieves and adversely affects appellant:

a) by subjecting appellant, as well as all other owners of existing stations, in Illinois and particularly in Chicago, to increased danger of loss or reduction of facilities now enjoyed by them, through the operation of the Davis
2 Amendment and of the Commission's regulations made pursuant thereto;

b) by placing an additional obstacle in the way of appellant, as well as all other owners of existing Chicago stations, securing facilities which will give increased broadcast service to rural listeners as distinguished from urban listeners located in Chicago or its immediate vicinity;

c) by subjecting appellant, as well as all other owners of existing Chicago stations, to diminution of revenue, through the allocation of additional facilities in Chicago.

3. Although it appears that a hearing was held before the Commission with respect to said applications of WBBM Broadcasting Corporation and KFAB Broadcasting Company, appellant was not notified thereof nor afforded an opportunity to be heard with respect thereto, all in violation of the requirements both of Sec. 11 of the Radio Act of 1927 and of the Commission's Rules and Regulations.

4. Although immediately after hearing of said decision appellant filed with the Commission a protest and motion for reconsideration (true copies of which and of a supplement thereto are attached hereto as Appendices A and B and incorporated herein as if fully set forth), the Commission did, on April 11, 1933, erroneously deny said protest and motion without giving appellant any opportunity to be heard with respect thereto.

5. The Commission erred in denying appellant's protest and motion in that said denial was based in whole or
3 in part on a document entitled "Demurrer to Protest and Motion for Reconsideration" filed in behalf of WBBM Broadcasting Corporation and KFAB Broadcasting Company, at some time unknown to appellant and of which appellant had no knowledge until after the Commission had denied said protest and motion, when appellant for the first time received a copy of said document by mail; said document containing many statements and representations which are not accurate and which, if a hearing were afforded, would be shown to be inaccurate.

6. The Commission's decision granting said applications is erroneous in that it is based on inaccurate information which, if appellant had been notified and made a party to the hearing, would have been shown not to be based on fact, said information having to do, among other things, with the supposed need for increased hours on the part of WBBM, with the interference or lack thereof, which would result from granting the applications, the nature and the working of the present contract arrangement between WGN, Inc. and Columbia Broadcasting System, Inc., and many others.

7. The Commission's decision is erroneous in that it is in violation of its Rules and Regulations with respect to clear channels, forbidding simultaneous evening operation of two stations on such a channel, and particularly in violation of said Rules and Regulations as construed and applied by it in other cases heretofore decided by it (a true copy of one such decision being attached hereto as Appendix C and made a part hereof as if fully set forth).

8. The Commission's decision is erroneous in that it is in clear violation of the Davis Amendment, and of its Rules and Regulations adopted pursuant thereto, in that the decision increases the broadcast facilities of an overquota state and of an overquota zone (the Commission's own previous interpretation of said Davis Amendment and of said Rules and Regulations in similar situations appearing in Appendices B and C).

4 9. The Commission's decision is contrary to public interest, convenience and necessity in that

a) It sacrifices the interests of and decreases the broadcast facilities enjoyed by rural listeners of KFAB in order to provide increased hours of operation for WBBM and increased broadcast facilities for urban listeners in Chicago and its immediate vicinity.

b) If additional facilities are available, or become available, in the Chicago area, such facilities should be granted in such a way as to provide increased service for rural listeners and not merely for urban listeners.

c) It increases the already excessive broadcast facilities now owned and/or controlled by the two national network systems in Chicago.

d) Urban listeners and advertisers in Chicago and immediate vicinity now enjoy adequate broadcast facilites and service of the sort proposed to be rendered by WBBM in the additional hours granted to it.

e) The objections alleged to be sought to be achieved by said applications can actually be achieved by another method which will be consistent with the law and with the Commission's regulations, i. e., by an exchange of evening hours between WBBM and KFAB (both controlled by Columbia Broadcast System, Inc.) whereby the former obtains the hours 10 p. m. to midnight and the latter obtains hours prior to 10 p. m. which will be more suitable to its audience.

5 f) Under cover of an "experimental" grant, the applicants sought and obtained what are in reality regular additional hours of operation to be used for commercial purposes, to the detriment of the listening public.

10. The Commission's decision is arbitrary and capricious, and is not based on a proper interpretation of the standard of public interest, convenience or necessity.

### *Revision Requested.*

Appellant prays for judgment of this Honorable Court, reversing said decision of the Federal Radio Commission and granting such further relief as to the Court may seem just and proper.

WGN, INC.,
By LOUIS G. CALDWELL,
ARTHUR W. SCHARFELD,
*Attorneys for Appellant.*

### *Notice to the Federal Radio Commission.*

Please take notice that the foregoing notice of appeal and reasons therefor is being filed this 13th day of April, 1933, in the Court of Appeals of the District of Columbia, pursuant to the provisions of the Radio Act of 1927, as amended.

LOUIS G. CALDWELL,
ARTHUR W. SCHARFELD,
*Attorneys for Appellant.*

### *Acknowledgment of Service.*

Service of the foregoing notice of appeal and reasons therefor, and receipt of a copy thereof, are hereby acknowledged this 13th day of April, 1933.

FEDERAL RADIO COMMISSION,
By BEN S. FISHER,
*Atty. General, Counsel.*

6

## APPENDIX A.

Copy.

Federal Radio Commission, Washington, D. C.

Docket Nos. 1668, 1669.

In re Applications of WBBM BROADCASTING CORPORATION (WBBM), Chicago, Illinois, for Authority to Install Automatic Frequency Control and for Modification of License (to Synchronize with Station KFAB Certain Specified Night Hours),

and Docket Nos. 1670, 1671.

In re Applications of KFAB BROADCASTING COMPANY (KFAB), Lincoln, Nebraska, for Modification of License (to Synchronize with Station WBBM Certain Specified Night Hours) and Authority to Install Automatic Frequency Control.

### *Protest and Motion for Reconsideration.*

WGN, Inc., hereby protests against the action of the Commission taken on March 24, 1933, granting the above described applications, and respectfully requests that said action be reconsidered and set aside, and that said applications be denied, or, failing that, that they be designated for further hearing with an opportunity to WGN, Inc., to present evidence and to be heard in opposition to said applications:

In support of the foregoing protest and motion, WGN, Inc., states, and if given the opportunity, will present evidence to prove, the following:

### A. Nature of Protestant's Interest.

1. WGN, Inc., an Illinois Corporation, is a wholly-owned subsidiary of The Tribune Company, also an Illinois Corporation, publisher of the Chicago Tribune.

7 2. WGN, Inc., is engaged in operating its broadcasting station WGN on 720 kc. (a clear channel) with 25 kw. power at Chicago (transmitter near Elgin), Illinois, under license from the Federal Radio Commission. Prior to March 4, 1932, WGN was operated directly by the Tribune Company. On that date, with the written consent of the Commission, the license to operate WGN was assigned and transferred to WGN, Inc.

3. Said broadcasting station WGN consists of a merger of what were originally three separate broadcasting stations, operating on two separate frequencies in the broadcast band, the first of which was originally licensed by the Secretary of Commerce on May 19, 1922. WGN (including its predecessor station) has been in continuous operation ever since that date under successive licenses first from the Secretary of Commerce and later from the Federal Radio Commission.

4. During the summer and fall of 1928 the Commission was engaged in an effort to reduce the broadcast facilities in certain parts of the United States, including the State of Illinois and particularly in and near Chicago, in an effort to comply with the Commission's interpretation of the so-called Davis Amendment (45 Stat. 373). At that time it was claimed by the Commission that the State of Illinois, principally because of the broadcast facilities then used in the Chicago area, had more than its fair and equitable share of the broadcast facilities in the Fourth Zone, and that the Fourth Zone had more than its equal share of the broadcast facilities in the United States. In an effort to cooperate with the Commission toward a reduction in the broadcast facilities used in the Chicago area, The Tribune Company consented to a merger of its three stations into one station using a single frequency (i. e., the frequency 720 kc. theretofore used by two of the stations dividing time) and gave up and surrendered the second frequency (1090 kc.). Similar sacrifices were made by a number of other (but not all) Chicago broadcasting stations, some

suffering a reduction in power, others a reduction in hours of operation, and several being entirely eliminated.

8 5. Since the fall of 1928 the Commission has frequently adhered to, and has given public expression to, the view that, notwithstanding the above-mentioned reduction in facilities, there was still an excess of broadcast facilities in the Chicago area, has periodically published tabulations stating that Illinois (as well as the Fourth Zone) is "over-quota," and has adopted and maintained regulations purporting to provide for a reduction in the facilities used in an over-quota state on application proceeding from an under-quota state. Acting on this view of the law and the facts, and relying on said regulations, the Commission has, as a general rule, denied applications the granting of which would have increased the facilities used in the Chicago area, and on October 16, 1931, rendered a decision completely eliminating two Chicago stations (WIBO and WPCC) which, according to the undisputed evidence presented to the Commission were rendering a meritorious service. While this decision was reversed in the Court of Appeals of the District of Columbia, the case is now pending before the Supreme Court of the United States, before which Court the Commission is urging that its decision was correct and should be upheld. In 1930, furthermore, The Tribune Company applied for an increase of WGN's power from 25 kw. to 50 kw. and, after an extensive hearing, the Chief Examiner of the Commission recommended that the application be granted. Although the undisputed evidence showed that no interference or increase in quota would be caused (720 kc. being a clear channel) and that the increase would serve public interest, the Commission denied the application (as against other applications proceeding from other States in the Fourth Zone) entirely on the ground that WGN is located in the Chicago area.

6. The Commission further takes the view (which view was openly expressed in its decision denying WGN's application for increased power) "that treaties may be made which would materially affect both the use and number of frequencies" in the broadcast band, and, in particular, that such a treaty may soon be negotiated between the North American nations at a conference soon to be held in Mexico City; and that, if such a treaty is negotiated a further re-

duction in the facilities used in the Chicago area will become necessary.

9 7. If it be true there is now any excess of facilities in the Chicago area, it is due to the fact that, without notice or opportunity for hearing to other Chicago stations, and partly since the enactment of the Davis Amendment, the Commission itself has in the past granted large increases of power to certain Chicago stations in such a way as to convert such stations from a regional character to a clear channel character with respect to power. Of the total facilities now used in Illinois, by far the greater portion (in terms of units as established by the Commission's regulations) consist in clear channel stations located in the Chicago area as follows:

| Call letters. | Frequency. | Power. | Unit value. |
|---|---|---|---|
| WMAQ | 670 kc. | 5 kw. | 5 |
| WGN | 720 kc. | 25 kw. | 5 |
| WBBM–WJBT | 770 kc. | 25 kw. | 3.92 |
| WENR–WLS | 870 kc. | 50 kw. | 5 |
| KYW | 1020 kc. | 10 kw. | 5 |
| | | Total | 23.92 |

At the time the Commission was established only 2½ of said stations (in terms of full-time operation on a clear channel) were of a clear channel character, i. e., WGN, WLS and KYW. The others were increased by the Commission from power of 1 kw. or less to 5 kw. or more. This is true of WBBM-WJBT (which are in reality one station and will be referred to as WBBM). Furthermore, under the Commission's reallocation of November 11, 1928, WBBM was licensed to divide time with KFAB, Lincoln, Nebraska, (4/7 to WBBM and 3/7 to KFAB) but, without authority from the Commission, WBBM and KFAB thereafter operated simultaneously in the daytime. Early in 1931, without notice or opportunity for hearing to any other Chicago stations (including WGN), the Commission formally authorized such simultaneous operation by WBBM and KFAB, thus causing a substantial increase in the units used in Illinois, although the geographical separation between WBBM and KFAB is greatly insufficient for such operation and the result thereof has been to prevent either station from being satisfactorily received in the daytime over a large area where either one or the other would be received satisfactorily if operating alone on the frequency. The result of the Commission's decision herein complained of is, under the guise of an "experimental" grant, to authorize WBBM to have virtually full-time hours of operation.

10 8. Of the above-mentioned clear channel stations WGN is the only station not owned and/or controlled by one or the other of the two large broadcast networks, National Broadcasting Company and Columbia Broadcasting System, Inc. By stock ownership or contract, the National Broadcasting Company controls WMAQ, WENR-WLS and KYW and Columbia Broadcasting System, Inc., controls WBBM. Each of said networks also has access to other Chicago stations, of which there are several.

9. WGN, Inc., has in course of preparation another application for increased power for WGN and intends to file such application in the immediate future. If there is to be any increase in the facilities charged to Illinois, the increase should consist in improved service in rural areas such as will result from increased power and not in an increase in broadcast service for Chicago listeners at the expense of rural listeners.

10. The decision of the Commission herein complained of aggrieves and adversely affects WGN, Inc., in the following respects—

a) It subjects WGN (as well as all other Chicago Stations) to an increased danger of attack and loss of facilities based on the claim that Illinois, and particularly the Chicago area, (as well as the Fourth Zone) now has in excess of its lawful share of such facilities.

b) It subjects WGN, Inc. (as well as other independently-owned Chicago stations) to an economic injury due to the increase of competitive facilities, and places it at an increased disadvantage in negotiating both with clients and with networks for fair compensation for the use of its facilities.

c) Under the Commission's interpretation of the Davis Amendment it places an obstacle in the way of the securing of additional power for WGN, which increase of power would not increase the facilities enjoyed by listeners in the Chicago area but would increase the broadcast service rendered to listeners in rural areas outside of Chicago.

11 B. Reasons in Support of Protest and Motion.

1. WGN, Inc., was neither notified nor afforded an opportunity to be heard with respect to said applications of WBBM Broadcasting Corporation and KFAB Broadcasting Company, in violation of the requirements both of Sec. 11 of the Radio Act of 1927 and of the Commission's Rules and Regulations.

2. WGN, Inc. is aggrieved and adversely affected by the Commission's action granting said applications, as hereinbefore stated.

3. Said action of the Commission is in violation of the Commission's Rules and Regulations respecting the use of clear channels, in that it permits the simultaneous evening operation of two stations on such a channel.

4. Said action is contrary to public interest in that it sacrifices the interests of rural listeners of both WBBM and KFAB for the sake of local listeners in the immediate vicinity of the two stations, and, so far at least as the Chicago area is concerned, the local listeners are already adequately served.

5. Said action is contrary to public interest in that it is in contravention of sound engineering principles heretofore usually recognized and given effect by the Commission, and will result in ruinous interference to rural listeners now receiving satisfactory or fair service from either WBBM or KFAB.

6. Said action is contrary to public interest in that it deprives a large rural area around Lincoln, Nebraska, of any clear channel service from KFAB, it being the only clear channel station located in that part of the Fourth Zone.

7. Said action is contrary to public interest in that it increases the already excessive broadcast facilities now owned or controlled by the two networks in the Chicago area.

8. Said action was, according to the Commission's "Statement of Facts, Grounds for Decision and Order of the Commission" rendered therein, based on erroneous information and representations including, among others, the following subjects—

a) The character of the arrangement between Columbia Broadcasting System, Inc., and WGN, Inc., is not accurately described. The extent to which WGN's facilities are available for Columbia programs is considerably 12 greater than as stated in said document and is amply sufficient for the needs of Columbia Broadcasting System, Inc.

b) Present reception conditions in the area between WBBM and KFAB are very much better than as described in said document, with respect either to WBBM or KFAB or WGN (or, indeed, with respect to other Chicago clear channel stations). The evening service rendered by all three stations over the entire area in the evening is such as to range from fair to satisfactory, and is usable and is actually used and relied upon by large numbers of listeners.

c) The use of the proposed apparatus and equipment for synchronization will result in much greater interference and a much greater decrease in service than indicated in said document, and will produce results which the Commission has previously held to be contrary to public interest in other cases involving synchronization on clear channels and which its engineers have regularly opposed in such other cases, even for "experiments."

d) The applications for simultaneous evening operation, while appearing under the guise of attempts to engage in bona fide experimentation, are in reality simply for increased hours of operation for WBBM at Chicago for commercial competitive purposes.

e) A full disclosure of the relations between Columbia Broadcasting System, Inc., and KFAB Broadcasting Company would have disclosed that the former has such control over the latter that, with the approval of the Commission, the hours 10 P. M. to 12 Midnight could be secured for WBBM by giving KFAB a corresponding number of evening hours prior to 10 P. M. (when there is admittedly sufficient outlet for Columbia programs in Chicago) with the result that KFAB would have more desirable hours than it now has for the population it serves.

13 WGN, INC.,
By LOUIS G. CALDWELL,
ARTHUR W. SCHARFELD,
Of KIRKLAND, FLEMING, GREEN & MARTIN,
*Its Attorneys.*

## 11 B. Reasons in Support of Protest and Motion.

1. WGN, Inc., was neither notified nor afforded an opportunity to be heard with respect to said applications of WBBM Broadcasting Corporation and KFAB Broadcasting Company, in violation of the requirements both of Sec. 11 of the Radio Act of 1927 and of the Commission's Rules and Regulations.

2. WGN, Inc. is aggrieved and adversely affected by the Commission's action granting said applications, as hereinbefore stated.

3. Said action of the Commission is in violation of the Commission's Rules and Regulations respecting the use of clear channels, in that it permits the simultaneous evening operation of two stations on such a channel.

4. Said action is contrary to public interest in that it sacrifices the interests of rural listeners of both WBBM and KFAB for the sake of local listeners in the immediate vicinity of the two stations, and, so far at least as the Chicago area is concerned, the local listeners are already adequately served.

5. Said action is contrary to public interest in that it is in contravention of sound engineering principles heretofore usually recognized and given effect by the Commission, and will result in ruinous interference to rural listeners now receiving satisfactory or fair service from either WBBM or KFAB.

6. Said action is contrary to public interest in that it deprives a large rural area around Lincoln, Nebraska, of any clear channel service from KFAB, it being the only clear channel station located in that part of the Fourth Zone.

7. Said action is contrary to public interest in that it increases the already excessive broadcast facilities now owned or controlled by the two networks in the Chicago area.

8. Said action was, according to the Commission's "Statement of Facts, Grounds for Decision and Order of the Commission" rendered therein, based on erroneous information and representations including, among others, the following subjects—

a) The character of the arrangement between Columbia Broadcasting System, Inc., and WGN, Inc., is not accu-

rately described. The extent to which WGN's facilities are available for Columbia programs is considerably
12 greater than as stated in said document and is amply sufficient for the needs of Columbia Broadcasting System, Inc.

b) Present reception conditions in the area between WBBM and KFAB are very much better than as described in said document, with respect either to WBBM or KFAB or WGN (or, indeed, with respect to other Chicago clear channel stations). The evening service rendered by all three stations over the entire area in the evening is such as to range from fair to satisfactory, and is usable and is actually used and relied upon by large numbers of listeners.

c) The use of the proposed apparatus and equipment for synchronization will result in much greater interference and a much greater decrease in service than indicated in said document, and will produce results which the Commission has previously held to be contrary to public interest in other cases involving synchronization on clear channels and which its engineers have regularly opposed in such other cases, even for "experiments."

d) The applications for simultaneous evening operation, while appearing under the guise of attempts to engage in bona fide experimentation, are in reality simply for increased hours of operation for WBBM at Chicago for commercial competitive purposes.

e) A full disclosure of the relations between Columbia Broadcasting System, Inc., and KFAB Broadcasting Company would have disclosed that the former has such control over the latter that, with the approval of the Commission, the hours 10 P. M. to 12 Midnight could be secured for WBBM by giving KFAB a corresponding number of evening hours prior to 10 P. M. (when there is admittedly sufficient outlet for Columbia programs in Chicago) with the result that KFAB would have more desirable hours than it now has for the population it serves.

13 WGN, INC.,
By LOUIS G. CALDWELL,
ARTHUR W. SCHARFELD,
Of KIRKLAND, FLEMING, GREEN & MARTIN,
*Its Attorneys.*

14

Copy.

*Affidavit.*

City of Washington,
*District of Columbia, ss:*

Louis G. Caldwell, being first duly sworn, on oath deposes and says that he is the attorney and duly authorized representative of WGN, Inc., whose name is subscribed to the foregoing Protest and Motion for Reconsideration; that he has knowledge of the facts stated in said Protest and Motion for Reconsideration; and that said facts are true.

LOUIS G. CALDWELL.

Subscribed and sworn to before me this 27th day of March, 1933.

(Signed) JULIE M. MAYER,
*Notary Public.*

15

## Appendix B.

Federal Radio Commission, Washington, D. C.

Docket Nos. 1668, 1669.

In re Applications of WBBM Broadcasting Corporation (WBBM), Chicago, Illinois, for Authority to Install Automatic Frequency Control and for Modification of License (to Synchronize with Station KFAB Certain Specified Night Hours),

and Docket Nos. 1670, 1671.

In re Applications of KFAB Broadcasting Company (KFAB), Lincoln, Nebraska, for Modification of License (to Synchronize with Station WBBM Certain Specified Night Hours) and Authority to Install Automatic Frequency Control.

*Supplement to Protest and Motion for Reconsideration.*

WGN, Inc., hereby supplements its Protest and Motion for Reconsideration, filed on March 27, 1933, in the above entitled matter, with the following facts:

1. Subsequent to the filing of said Protest and Motion for Reconsideration, the Commission on March 31, 1933 rendered its decision denying the applications of the Indianapolis Power & Light Co. (WFBM) and The South Bend Tribune (WSBT) for modification of station license (Docket Nos. 1636 and 1652). The latter applications requested permission to operate stations WFBM and WSBT simultaneously during the daytime and so are similar in type to those of the WBBM Broadcasting Co. and the KFAB Broadcasting Co. which requested such authorization not only during the daytime hours but also during the nighttime hours.

2. The Commission's decision in granting the WBBM and KFAB applications is inconsistent with, and directly contrary to, its action denying the WFBM and WSBT applications as shown by its Grounds for Decision (Exhibit A) in the latter case.

16 (a) The 2d ground for decision states:

> "That the operation of these stations simultaneously during daytime hours as proposed herein would result in mutual interference within the service areas of both stations."

The same result of mutual interference was found in the WBBM and KFAB cases.

(b) The 3rd ground states:

> "That the Fourth Zone is overquota in broadcast facilities."

Both WBBM and KFAB are in the Fourth Zone, and in overquota States within that Zone, whereas WFBM and WSBT are in the underquota State of Indiana.

(c) The 4th ground states:

> "That the granting of these applications would violate the provisions of Commission regulations providing that no application involving the allocation of additional facilities in an over-quota zone may be granted if the grant would result in additional interference with any station or stations now licensed."

The foregoing reason applies with equal, if not greater, force to the WBBM and KFAB applications since both stations are in overquota States in overquota zones and WBBM, in particular, is in the congested Chicago area.

3. The Commission failed to take cognizance of the increased quota resulting from its decision on the WBBM-KFAB applications and yet cites its regulations with respect to quota as grounds for denying the WFBM-WSBT applications. If the decision in the latter cases is to be accepted as precedent for the guidance of broadcasting stations, then the decision on the WBBM-KFAB applications should be reconsidered and set aside.

WGN. INC.,
By LOUIS G. CALDWELL,
ARTHUR W. SCHARFELD,
Of KIRKLAND, FLEMING, GREEN & MARTIN,
*Its Attorneys.*

17 Ex. A.

8267.

Federal Radio Commission, Washington, D. C.

Docket No. 1636.

In re Appplication of INDIANAPOLIS POWER & LIGHT CO. (WFBM), Indianapolis, Indiana, for Modification of Station License.

Docket No. 1652.

In re Application of THE SOUTH BEND TRIBUNE (WSBT), South Bend, Indiana, for Modification of Station License.

*Statement of Facts, Grounds for Decision, and Order of the Commission.*

Preliminary Statement and the Issues.

These are concurrent applications for modification of station licenses to permit the simultaneous operation of broadcast stations WFBM and WSBT during daytime hours, filed by the Indianapolis Power & Light Company

(WFBM), Indianapolis, Indiana, and The South Bend Tribune (WSBT), South Bend, Indiana. WFBM and WSBT are now licensed to divide time on the 1230 Kilocycle frequency, each station having specified hours. Under the applicant's proposal, the power of Station WFBM would be reduced from 1 kw. to 500 watts for daytime operation. Station WSBT is licensed to use 500 watts power, and no change in the power of this station is involved.

A hearing in the matter was held by Examiner Hyde on September 22, 1932. The Examiner's Report (No. 437) and recommendation that both applications be denied was submitted December 10, 1932. The applicants filed exceptions to the recommendation and requested an opportunity for oral argument. This request was granted and on March 9, 1933 the matter was argued before the Commission.

## Statement of Facts.

Radio Station WFBM is a commercial broadcast station operated in Indianapolis by the Indianapolis Power & Light Company.

The City of Indianapolis has a population of 364,161. It is the State capital and by far the largest city of the State of Indiana, having a population almost 300,000 in excess of the next ranking city. It is located near the geographical center of the state and is known in fact as one of the great inland cities. Its importance as a manufacturing center and as a railway junction and shipping point is, of course, well known. There are two Indianapolis
18 broadcast stations, applicant's station WFBM, and
Station WKBF. The latter is a 500-watt station licensed to share time with Station WBAA, West Lafayette, Indiana.

It appears that Station WFBM is operated every hour of the broadcast day available to the station in its division of time with Station WSBT, South Bend. A very substantial amount of money is expended by the licensee in the maintenance of a large staff and in the presentation of talent. The income received from operations is not shown, but according to the testimony it does not cover total operating costs amounting to upwards of $110,000 a year.

WFBM programs are about equally divided between chain programs of the Columbia Broadcasting System and programs of local origin. Local civic organizations, and local church organizations in particular, seem to have very liberal use of the facilities of the station. The part-time operating assignment, of course, limits the number of features that may be presented. At times this restriction on time has prevented the broadcasting of certain programs of nation-wide interest, which would otherwise have been presented.

Radio Station WSBT, South Bend, is operated by The South Bend Tribune, a well established newspaper. More time is desired by the licensee for the broadcasting of additional chain features; to permit the extension of certain radio educational work, an activity in which WSBT seems to take an unusually active part; and to make it possible for the licensee to handle additional commercial business and thereby increase the income derived from the operation of the station. The evidence does not show whether or not the station is now operating on a paying basis.

South Bend is located in the northern part of the State of Indiana. The population of the city is 104,193, and the population of St. Joseph County in which the city is located, is 160,033. There are two South Bend broadcast stations, WSBT, and WFAM, a 100 watt part-time station. WSBT is not permitted to operate while WFAM is operating on account of the fact that the frequency separation between the two stations is only 30 kilocycles. Both stations are licensed in the name of The South Bend Tribune.

Station WSBT, like WFBM, presents Columbia Broadcasting System programs and programs of local origin. The local churches, schools and civic organizations have the cooperation of the station in their various activities. In this connection the station broadcasts, among other educational and school programs, lecture material from the University of Notre Dame, regular programs by the University Band, and programs by the Glee Club. WSBT has the same part-time schedule handicap referred to in reference to Station WFBM. The evidence indicates, however, that the programs of the station are well arranged and well presented. The station has been in operation since 1922 and it has an experienced staff of engineers, musicians, clerks, and announcers.

The distance from WFBM, Indianapolis, to WSBT, South Bend, is 135 miles. This geographical separation, it appears from competent testimony, is less than half the separation required to prevent interference within the 500 microvolt per meter fields of the stations when two 500-watt stations are operated on the same frequency under average daytime operating conditions. It also appears from competent technical testimony that the operation of WFBM and WSBT simultaneously during daytime hours, each station using 500 watts power, would ordinarily cause
such interference as to limit the service of each
19 station to a service area much smaller than the area
circumscribed by its 500 microvolt per meter contour.

The applicants in their presentation of evidence urge that notwithstanding the results to be expected under average conditions, the fields laid down by WFBM and WSBT are such, whatever the causes or reasons therefor may be, that the simultaneous operation of these stations daytime hours with the power of WFBM reduced to 500 watts would not cause interference within the 500 microvolt per meter contour of either station. It is conceded that there would be interference in a considerable part of their respective service areas extending outside the 500 microvolt contours.

WFBM-WSBT exhibits numbered 1 and 1A to 1K, inclusive, show plots of the fields of WFBM and WSBT and other studies based on a survey involving some 89 field strength measurements made over a period of three days, September 13, 14 and 15, 1932, by an experienced radio engineer. It appears that the WFBM signal or field, as determined from the data obtained in this survey, has a field strength of 10 millivolts 7.3 miles from the transmitter, a field strength of 2 millivolts at a distance of 19.8 miles, a field strength of 500 microvolts at a distance of 30 miles, and a field strength of 50 microvolts at a distance of about 75 miles. A reduction in the power of WFBM may be expected to reduce the field strength of the station at any given point. On the basis of the measurements obtained in this survey it may be expected that the radius of the 500-microvolt contour would be reduced from 30 miles to approximately 24 miles. WSBT, according to this survey, has a 10-millivolt signal at a distance of 4.84 miles, a 2 millivolt signal at a distance of 12.4 miles, a 500-microvolt signal at a distance of approximately 33 miles, and a 50 microvolt signal at a distance of about 90 miles. In the series of tests made on a line between the two stations no measurable signal of Station WFBM was found in the vicinity of the WSBT 500 microvolt per meter contour, as fixed in this survey, although a 28-microvolt signal was measured about 17 miles south of this contour in the direction of WFBM. In the vicinity of the corresponding WFBM 500 microvolt per meter contour, the field of WSBT was measured and determined to have a field strength of about 22 microvolts.

The above survey shows the 500 microvolt per meter contours of both stations protected by a better than 20 to 1 ratio of desired signal to undesired signal, and it appears that a ratio of 20 to 1 is accepted by engineers generally as adequate protection where two stations operate under the conditions proposed in these cases. The 500 microvolt per meter contour defines what has been termed the good service area of a broadcast station. If this definition and the data submitted from applicants' survey is accepted it follows that the simultaneous operation of WFBM and WSBT daytime hours would not cause interference within the good service area of either station.

Outside of the 500 microvolt per meter fields or so-called good service areas of the two stations there would be an area some 75 miles in breadth lying between the two stations in which it is conceded neither station would have the necessary 20 to 1 advantage in field strength. That part of the field of each station beginning near the 500-microvolt contour and extending outward forty-five to sixty miles to the 50 microvolt extremity of the field would be rendered useless. In this connection the evidence shows that a field strength as low as 50 microvolts per meter may be acceptable under certain conditions. It probably would not be receivable on many old-type receivers, and it would
not prove acceptable on any kind of a receiver in
20 areas having high noise levels such as industrial
areas and areas near high power transmission lines.
In this connection the applicants point to the fact that the general area lying between Indianapolis and South Bend may be expected to receive stronger signals from clear channel stations carrying Columbia programs than either applicant station would deliver.

Since WFBM and WSBT are located in cities where there is a concentration of population within relatively small areas it may reasonably be expected that the two stations operating simultaneously would serve more people than either station operating alone, regardless of the interference caused outside their respective 500 microvolt per meter fields. The testimony as to this is in substantial agreement.

Referring again to the applicants' survey it is noted that the measurements submitted were taken over a brief period and further that none of them were taken later than 5:30 P. M. This data could not be accepted as an adequate basis for a determination as to probable signal values for the varying seasons of the year. It does not appear to take into account the effects of sky wave propagation which is a factor to be considered, particularly so with respect to the two hours just after sunrise and the two hours just before sunset.

Considering all of the evidence on the question of interference, it is problematical whether WFBM and WSBT could be operated simultaneously daytime hours without causing interference within their respective good, or first-grade service areas, and it is practically certain that there would be interference outside their immediate first-grade service areas.

The granting of both applications would result in a net increase in the quota of the State of Indiana and the quota of the Fourth Zone of .2 of a unit. Indiana is 2.06 units or 22 per cent under-quota. The Fourth Zone is 21.09 units or 26 per cent over-quota.

## Grounds for Decision.

On consideration of the evidence in these cases, the Examiner's report, the exceptions, and the arguments presented, the Commission finds:

1. That Station WFBM and Station WSBT are rendering meritorious service;

2. That the operation of these stations simultaneously during daytime hours as proposed herein would result in mutual interference within the service areas of both stations;

3. That the Fourth Zone is over-quota in broadcast facilities;

4. That the granting of these applications would violate the provisions of Commission regulations providing that no application involving the allocation of additional facilities in an over-quota zone may be granted if the grant would result in additional interference with any station or stations now licensed; and

5. That public interest, convenience and/or necessity would not be served by the granting of either or both applications.

21 The Exceptions.

The exceptions filed in behalf of the applicant, which were addressed specifically to the Examiner's recommendation, are necessarily overruled in the Commission's findings and decision.

Order.

It is ordered:

1. That the application of the Indianapolis Power & Light Company (WFBM) for modification of station license be, and the same is hereby denied; and

2. That the application of The South Bend Tribune (WSBT) for modification of station license be, and the same is hereby denied.

Filed March 31, 1933.

22 *Affidavit.*

District of Columbia, *ss:*

Arthur W. Scharfeld, being first duly sworn on oath, deposes and says that he is one of the attorneys and duly authorized representatives of WGN, Inc., whose name is subscribed to the foregoing Supplement to Protest and Motion for Reconsideration; that he has knowledge of the facts stated in said Supplement to Protest and Motion for Reconsideration; and that said facts are true.

—— ——.

Subscribed and sworn to before me this 4th day of April, A. D. 1933.

—— ——,
*Notary Public.*

23

## APPENDIX C.

5843.

### Federal Radio Commission, Washington, D. C.

Docket No. 1365.

In re Application of ATLANTIC BROADCASTING CORPORATION, New York, New York, for Construction Permit (New Station).

*Statement of Facts, Grounds for Decision, and Order of the Commission.*

### Preliminary Statement and the Issues.

This proceeding arose upon an application filed by Atlantic Broadcasting Corporation, (Station WABC), New York, N. Y., for a construction permit. Station WABC now operates upon the frequency of 860 kilocycles with power output of 50 kilowatts and unlimited hours of operation. Authority is requested to construct a new transmitter at Washington, D. C. to operate when constructed in synchronization with the present transmitter of WABC in New York, experimentally, upon the same frequency with 250 watts power output and unlimited hours of operation. Hearing upon the application was held before the entire Commission on October 19 and 20, 1931. The American Broadcasting Company, (Station WOL) of Washington, D. C., appeared as an intervenor.

The issue in this case is whether or not public interest, convenience and necessity would be served by authorizing the construction in Washington, D. C. of a so-called booster station to Station WABC which would broadcast the same programs upon the same frequency as are broadcast by the latter station.

### Statement of Facts.

The Atlantic Broadcasting Corporation, the applicant in this case, is owned entirely by the Columbia Broadcasting System, Inc., and serves largely as the engineering organization of the Columbia System. The applicant is the present licensee of Station WABC which is operated as the key station of the Columbia network in New York City. All of the New York features and a large majority of all Columbia programs are originated at WABC. The applicant also operates television Station W2XAB in New York City, Station W2XE which is engaged in relay broadcasting and various other experimental stations. In addition to the financial assets of the applicant, totaling over $800,000.00, the financial resources of the Columbia System are available for the construction and operation of the proposed station. The total cost of the installation of the proposed station would be approximately $46,650.00.

The applicant and its parent company have expended approximately $50,000.00 in the development of synchronized broadcasting carried on in cooperation with the Bell Laboratories, Inc.

It appears that this application is made for two main purposes: (1) to establish in the District of Columbia a full time outlet for the Columbia System so as to render to that area all programs broadcast by Station WABC, and
(2) to further the advancement of the radio art by
24 a successful demonstration of the efficient synchron-
ous operation of two radio broadcasting stations.

At the present time Station WMAL in Washington, owned and operated by M. A. Leese, is affiliated with the Columbia network and broadcasts many of the programs originating therein. This station is, however, primarily a local station serving a local interest as contrasted to the national interest served by the network. Many demands are made upon WMAL by local advertisers for time over that station and numerous sponsored programs are broadcast in no way identified with the chain features of Columbia. An average of 5 hours and 25 minutes per day of chain programs which are broadcast by WABC are not carried by WMAL, including many features of that network and some features which are originated in Washington but not carried by WMAL because of previously arranged local programs.

The Washington unit or office of Columbia System, composed of a local representative, secretary, studio hostesses, and clerical help, represents a cost of approximately $40,000.00 a year to Columbia. This office is instrumental in the building up of the many features of the chain programs which originate in Washington, including speeches of many persons outstanding in the political, social and economic life of the country and various concerts by Army, Navy and Marine Bands.

During 1930 Columbia spent approximately $6,800.00 in the construction of programs for the System's network and during that same year about 600 of these program features originated in Washington.

The present cost of operation through WMAL to the Columbia System, including the cost of the maintenance of the Washington office, approximates $85,000.00 per year and the estimated cost of the operation of the proposed station is about $105,000.00 per year, thus rendering an additional cost of approximately $20,000.00 to Columbia over the present arrangement. Although time would be sold by the applicant for chain programs over the proposed station it is estimated that revenue from the same would be insufficient to entirely make up the contemplated $20,000.00 additional cost. The resulting difference is expected to be more than compensated by the convenience in arranging network features originating in Washington and the rendering of additional Columbia programs in the National Capital.

The applicant does not contemplate the operation of the proposed station as a competitor to local stations in Washington since the network programs to be broadcast would preclude any local advertising.

There are now located in Washington, D. C., the following radio stations:

| | Power. | Frequency. | Time. |
|---|---|---|---|
| WRC.............. | 500 watts | 950 kc. | Unlimited. |
| WMAL............ | 250 watts<br>500 " LS | 630 kc. | " |
| WOL.............. | 100 watts | 1310 kc. | " |

In addition to these stations, service is received in that general area from various clear channel and high powered stations located elsewhere.

25 The Bell Laboratories have developed a method of frequency control, designed to keep two stations operating simultaneously upon the same frequency, which is proposed to be employed. By this system the radio transmitters would employ a crystal control vacuum tube

oscillator capable of holding its frequency within very narrow limits. A low frequency, derived from an absolute standard, would be transmitted over a telephone line at 4,000 cycles, which would be multiplied up by multivibrators to a frequency 10 kilocycles from the carrier to be controlled. This frequency is then beat against the carrier, resulting in a 10 kilocycle beat note which operates, in conjunction with the 10 kilocycle frequency taken directly from the multivibrator, a motor which will automatically change the carrier in case it deviates. The adjustment is entirely automatic. This system has been developed over a period of years by experiments, both in the field and in laboratories, and represents one of the latest developments in synchronous control equipment.

Field strength measurements introduced in evidence indicate that Station WABC now has a daytime consistent service area over a radius of 79 miles from the transmitter which has a population of approximately 14,000,000. The strength of the signal delivered throughout this area is 1 millivolt per meter or better. The nighttime consistent service area is limited by a high degree of signal fading to a radius of 50 miles having a population of approximately 10,900,000. The strength of the signal delivered throughout the nighttime area is 3.2 millivolts per meter or better. The signal of WABC at nighttime, beginning at points 50 miles from Wayne and extending to about 300 miles is subjected to fading because of the ratio of the sky and ground waves and cannot be relied upon to give satisfactory service consistently.

The estimated daytime good service area of the proposed 250 watt station in Washington would be a radius of 13.5 miles from the transmitter. The strength of the signal delivered throughout this area would be 1 millivolt per meter or better and the population receiving such service would be approximately 578,000. The nighttime good service area of the proposed station would be limited by interference and fading to a radius of about 7 miles from the transmitter and would have a population of approximately 552,000.

Since the signals from WABC and the proposed station would originate from different points upon the same frequency it would be impossible for them to meet in certain areas without causing interference, which would take the form of severe fading. In the areas around the lesser powered station where the strength ratio of either signal is less than 2 to 1, the resulting interference would preclude satisfactory reception. At all points around Washington between 13.5 miles and 35 miles from the transmitter of the so-called booster the signal from that station would have an expected ratio of two to one over the signal from WABC in the daytime and although the strength of the signal would not be sufficient for satisfactory reception it would be greater than is now received from WABC.

The area in which satisfactory daytime reception could not be obtained from either station, by reason of a signal ratio of less than 2 to 1 and greater than 1 to 2, would start about 35 miles from the transmitter and extend to approximately 60 miles from that point. Measurements introduced in evidence show that at no point within this expectant so-called high fading area does the present daytime signal received from WABC reach a strength of more than two-tenths of a millivolt, which is inadequate for satisfactory reception. This area would include the City of Balti-
26 more and adjacent territory. Beyond 60 miles from
Washington and approaching New York the ratio of the signal of WABC to that of the proposed station in the daytime would be 2 to 1 or greater as the transmitter of WABC is approached.

The area in which satisfactory nighttime service could not be received from either station, by reason of a signal ratio of less than 2 to 1 and greater than 1 to 2, would start about 7 miles from the transmitter of the proposed station and extend about 35 miles from that point and include an area of approximately 3,600 square miles. This area does not now receive good service from WABC consistently, i. e., the programs received therein from that station are subject to fading which destroys their value for high grade reception. However, many persons throughout the country, particularly in small towns and rural sections are forced to depend upon the same degree of radio service from clear channel stations as is now rendered in this area by WABC.

There are now located in Baltimore the following radio stations:

| | | |
|---|---|---|
| WCAO | 250 watts | 600 kc. |
| WBAL | 10 kilowatts | 1,060 kc. |
| WCBM | 250 watts—L. S.<br>100 watts night | 1,370 kc. |
| WFBR | 500 watts | 1,270 kc. |

Station WCAO, now broadcasting many of the programs of the Columbia chain, has an estimated good nighttime service area of a radius of about 15 to 20 miles from the transmitter. Although the service from WCAO extends during evening hours into some parts of the area in which good nighttime service could not be received from either the proposed station or WABC, the portion of that area expected to be served by WCAO is extremely small. The nighttime reception in that high fading area from other stations carrying Columbia programs such as WPG, Atlantic City, WCAU, Philadelphia, and WHP, Harrisburg, is subject to the same fading as is the signal now received therein from WABC.

The operation of the proposed station would not be expected to cause any interference with the services of other stations operating on adjacent channels except in the immediate vicinity of the transmitter where the signal strength would be very high. There would be a blotting out of the stations on the 850 and 870 kilocycle frequencies in an area extending about 1 mile from the transmitter of the new station.

The exact extent of the good day and nighttime service areas of the proposed station, the extent of the secondary or fading service areas of WABC, and the extent of the areas in which neither station could be received, could only be determined by the actual operation of the proposed station. No synchronization experiments have been conducted between two such located stations considering the frequency involved, respective power output to be employed, character of the terrain, etc.

The State of New York is entitled, as its share of broadcasting facilities, to 35.07 units and is now assigned 39.2 units. The District of Columbia is entitled to 1.35 units and is assigned 1.30 units. The granting of this application for the construction of a station to operate for experimental purposes would not increase the quotas for either New York or the District of Columbia since radio facilities employed in experimental use are not so chargeable.
27 However, should the proposed operation demonstrate the practicability of the project it would be necessary to either discontinue such operation or to regularly authorize the same. The latter procedure would result in increasing the quota of the already overquota State

of New York, it appearing that the main studio of the new station would be located in New York City although another studio would be located in Washington.

Under the provisions of General Order No. 40, the frequency of 860 kilocycles is a clear channel assigned to the First Zone and Sections 1 and 2 of General Order 42 provide that no station assigned this frequency be authorized to use in excess of 25 kilowatts regular and 25 kilowatts experimental power.

During the hearing the intervenor, Station WOL, moved to dismiss and deny the application, setting forth various grounds and reasons therefor. Ruling upon the motion was at that time reserved. It now appears that the motion made presents no substantial questions not necessarily involved in the consideration of all facts developed in this record.

## Grounds for Decision.

On the record in this case the Commission is of the opinion and so finds:

1. Washington, D. C., and surrounding area, now receive good radio broadcasting service from a number of existing stations. The programs now received include many of the same chain programs which are proposed to be offered by the applicant in this same area, and there does not appear to be a need in that area for additional radio service.

2. The operation of the proposed station would deprive those persons residing in an area of 3,600 square miles near Washington of the service now received from station WABC during evening hours. Although this present service from WABC in that area is not entirely satisfactory, the signal being subject to fading, it does not appear in this record that more satisfactory service is rendered throughout this area by any other existing radio broadcasting stations.

3. Although the authorization requested is for experimental purposes, it appears from this record that the proposed project is contemplated by the applicant as an experiment only insofar as it would demonstrate the practicability of the intended synchronous operation of two broadcasting stations. The evidence adduced in this record clearly indicates that the entire plan is regarded by the applicant as a commercial enterprise and business expedient.

The granting of an experimental authorization for the construction of a radio station to be operated as a purely commercial venture would be inconsistent with the proper application of the standard of public interest, convenience and/or necessity.

4. In the event the proposed project were authorized and the operation proved practical it would be necessary to authorize any subsequent operation upon a regular basis as distinguished from an experimental basis, and such procedure would involve an increase in the radio broadcasting facilities of either the District of Columbia (in the event the main studio of the proposed station were located therein) or the State of New York. In either case the granting of such authority would violate the provisions of
28 Section 9 of the Radio Act of 1927, as amended by the
Act approved March 28, 1928, in that the State of New York or the District of Columbia would be assigned more than their respective quotas of radio broadcasting facilities. No showing whatever is made in this record which would permit of an order requiring the forfeiture of any existing radio facilities.

5. Station WABC, New York City, is now licensed for the use of 25 kilowatts regular and 25 kilowatts experimental power. Should the requested facilities be considered as an addition to WABC the granting of this application on an experimental basis would increase the assigned experimental power of that station by 250 watts. If granted on a regular basis the assigned regular power of WABC would be increased by 250 watts. In either case a violation of General Order 42 would result in that WABC would then be assigned in excess of 25 kilowatts regular and 25 kilowatts experimental power.

6. Public interest, convenience and/or necessity would not be served by the granting of this application.

## Order.

On consideration of the evidence in this case, it is accordingly ordered:

(1) That the application of Atlantic Broadcasting Corporation for a construction permit be, and the same is hereby, denied.

Robinson, Commissioner, dissented.

Lafount, *Commissioner*, dissenting:

I dissent from the opinion of the majority of the Commissioners in this case. I believe that the Commission should acquaint themselves with all scientific developments of the art, and should permit such experiments as may demonstrate the practicability of such developments.

The Commission should do any and all things necessary (consistent with law) to improve radio reception. Therefore, if the applicant is correct in his assumption that the use of 860 kilocycle frequency will be increased and its efficiency improved, and since there seems to be little engineering testimony to the contrary, I believe the experiment should be permitted, and until its demonstration the question of quota be left in abeyance.

In my opinion this application should be granted upon the following terms and conditions:

That the exact location be subject to the approval of the Commission;

That the equipment be the most modern type available;

That it be required to operate on the frequency of 860 kilocycles and be synchronized by wire with broadcasting station WABC in New York;

29 That the maximum power output be 250 watts;

That upon completion an experimental license be issued, and the Radio Division of the Department of Commerce requested to carefully check the effects of this synchronized operation and that the Engineering Division of the Commission make such additional surveys as may be possible with available equipment, that the licensee be required to make observations and check carefully the effects of this operation and to make written report to the Commission every sixty days from date of license, that this be indeed an experiment and not a precedent;

That no assurance be given the applicant that a renewal license will be issued. The granting of a renewal license must depend upon the apparent necessity for continuing the experiment.

Filed December 4, 1931.

30

## APPENDIX C.

6726.

Federal Radio Commission, Washington, D. C.

Docket No. 1448.

In re Applications of TRAVELERS BROADCASTING SERVICE CORPORATION (Station WTIC), Hartford, Connecticut, for License (Special Authorization),

and Docket No. 1449.

CONSOLIDATED GAS & ELECTRIC LIGHT & POWER COMPANY OF BALTIMORE (Station WBAL), Baltimore, Maryland, for License (Special Authorization).

### *Statement of Facts, Grounds for Decision, and Order of the Commission.*

### Preliminary Statement and the Issues.

This proceeding arose upon the following two applications:

1. For station license filed by Traveler's Broadcasting Service Corporation (Station WTIC), Hartford, Connecticut.
2. For station license filed by Consolidated Gas and Electric Light and Power Company of Baltimore (Station WBAL), Baltimore, Maryland.

Applicant stations, WTIC and WBAL, are now regularly licensed to operate upon the 1060 kc. frequency (a clear channel assignment) on a time-sharing basis, WTIC using 50 kilowatts and WBAL 10 kilowatts power output. However, the present applications do not involve any changes in, or the continued use of, these regular operating assignments.

On December 16, 1930, the Commission authorized both applicants to install certain equipment designed to permit Station WTIC to operate synchronously with Station WEAF, New York City, upon 660 kc., and Station WBAL to operate synchronously with Station WJZ, New York City, upon 760 kc.; and to install certain other equipment to allow

rapid changes in frequency. The frequencies 660 and 760 kc. are both clear channel assignments now regularly licensed for the use of Stations WEAF and WJZ, respectively. Upon completion of the authorized construction, and on or about March 12, 1931, experimental synchronous operation was begun and has been continued on an experimental basis by virtue of authority granted, at the request of applicants, by the Commission from time to time. Existing authorizations permit such experimental opera-
31 tion of these stations until June 1, 1932. At the present time WTIC and WBAL each operate one-half time on 1060 kc. and synchronize one-half time with Stations WEAF and WJZ, respectively.

The present applications do not request regular licenses on a synchronized basis but seek only a further extension of authority to continue experimental synchronous operation. The applications came on for hearing and were heard before the entire Commission on January 13 and 14, 1932. Both applicants appeared and were represented by counsel, and the National Broadcasting Company, Inc., appeared as a respondent. Evidence was introduced by all parties including the Commission, and briefs were submitted by both applicants and the respondent.

The program service of the applicant stations and the qualifications of the licensees to continue their regular operation is not involved in the proceeding, the only issue here presented being whether or not a further extension of authorization to permit a continuance of their experimental synchronous operation should be granted.

## Statement of Facts.

Both applicant stations, WTIC and WBAL, are affiliated with the respondent, National Broadcasting Company, Inc., as associated stations broadcasting programs originating in that network. While the respondent is the licensee and operator of Stations WEAF and WJZ, it has no financial interest or stock ownership in the applicant corporations and does not control the activities of WTIC or WBAL other than cooperating in the synchronization experiments now being carried on.

It appears that the applicants first considered the idea of synchronization as a means to permit full time operation of each station during the latter part of 1930. Consideration was first given to the direct synchronizing of WTIC and WBAL and numerous conferences were held between the applicants and officials of the National Broadcasting Company. It being ascertained during the course of these negotiations that the cost of land wires connecting WTIC and WBAL would amount to about $80,000.00 yearly and the full time synchronous operation of the two stations would require the use of the same network program schedule, whereas WTIC is on the red network and WBAL the blue, an agreement was reached between the parties to synchronize WTIC with WEAF (the key station of the red network) and WBAL with WJZ (the key station of the blue network). Pursuant to this agreement authority was requested and obtained to conduct experiments along these lines.

Technical equipment for use in the experiments was furnished by the respondent which had previously conducted synchronization experiments over WJZ-KDKA, WEAF-WGY-KDKA, and other combinations.

The engineering staffs of both applicant stations have worked with engineers of the respondent in the operation of the synchronizing equipment and it appears that the experiments have cost all parties a substantial sum to date for auxiliary equipment, additional employees and land wire charges. How much, if any, of this cost has been offset by commercial revenue obtained as a result of the synchronous operation of these stations is not revealed. New equipment for use in the experiments had been ordered by the applicants at the time of hearing but not delivered.

32 The synchronizing equipment used and the methods followed in its operation are among the most successful which have been developed up to the present time. A constant-frequency oscillator in the Bell Laboratories produces a frequency of 5,000 cycles which is fed by telephone lines to WTIC and WEAF, this same procedure being followed with WBAL-WJZ. At the stations this frequency is multiplied to 660 kc. (760 kc. at WBAL and WJZ), the assigned frequency for synchronous operation. This method requires of course considerable special equipment at each station. A system of filters and other devices is utilized to eliminate undesired noises resulting from the lines and apparatus. A great deal of difficulty

which was first encountered due to surges on the telephone lines has been largely overcome by the use of electrically driven tuning-forks which act as stabilizers.

By far the greatest problem which is presented in the experiments conducted by these stations is that of phase synchronization of the radio waves at points of reception. The main problem of synchronization may be considered as one of accomplishing at all points synchronous reception of the waves emitted from the stations under question. In order to avoid distortion the waves from the synchronized stations must be received in the same phase relationship, both carriers and sidebands. Assuming a perfect synchronization of transmission by WTIC-WEAF and WBAL-WJZ, there is and can be no guarantee of perfect synchronization of reception. There are three principal ways in which changes will take place that result in phase shift or displacement between the received waves. These are as follows:

1. Phase shifts in apparatus during transmission that result in time phase differences in the transmitted waves;
2. The length of the paths of propagation between transmitters and given points of reception being different result in phase displacement between the received waves; and
3. Phase shifts in the propagated waves, both of the ground wave and sky wave, but generally encountered due to the refraction of the sky wave at the Kennelly-Heaviside layer.

With the synchronization equipment used it appears that the phase shifts in the transmitting apparatus and the phase shifts due to the rapid changes on the telephone lines may be minimized. However, there are slow phase shifts that take place on the telephone lines that can not be entirely eliminated and there does not appear to be any engineering possibility of entirely compensating for them.

Due to the fact that the distance between the transmitters and any given point of reception will differ in length by some fractional wave length, there is necessarily a phase displacement between the received waves. If this phase difference is 180°, the carrier waves will completely neutralize in the receiving antenna if of the same intensity. At all points interference patterns will be created having maximum intensity a wave length apart and minimum intensity half way between. No satisfactory evidence was offered with respect to overcoming this fundamental difficulty.

33 There are many causes of phase shift during propagation, such as the wave following different paths of transmission, changes in the medium of propagation, changes in the refraction due to the Kennelly-Heaviside layer, etc.

To avoid distortion of an objectionable character due to the causes described above, it was found by these experiments that the strength of the signal of one of the synchronizing stations had to be four times the strength of the signal from the other station. At points where this ratio of desired to undesired signal fell below two to one the distortion rendered reception unintelligible, being merged to satisfactory reception at points where the ratio of four to one was reached.

The principal difficulty encountered in the WTIC-WEAF experiment has been definitely established to be due to the overlapping of the ground waves. The transmitters of WTIC and WEAF are separated by approximately 88 miles. During the early course of these experiments and while synchronized with WEAF, Station WTIC was operated with day and night power varying between 1½ kw. to 50 kw. Later the power of WTIC was reduced to 5 kw. day and 1½ kw. to 5 kw. night. The power of WEAF has been maintained constantly at 50 kw. This has resulted in a substantial overlapping of ground waves although the areas in which the 4 to 1 ratio or less of the strength of one signal to the other has resulted have been varied by changes in WTIC's power.

Numerous observations were made and field intensity measurements taken during these experiments of the stations involved, i. e., WTIC-WEAF and WBAL-WJZ. These observations reveal that when WTIC and WEAF are operated synchronously with 50 kw. each there is a large area extending from Milford, Conn. (about 45 miles south of WTIC), to Middletown, Conn. (about 20 miles southeast of WTIC), in which unsatisfactory nighttime reception is experienced although reception from both stations is satisfactory when not synchronized and operating separately. This same condition was found to exist in an area north of WTIC from Windsor Locks, Conn., to and including

Springfield, Mass. The area in which the daytime reception of these stations is rendered unsatisfactory because of synchronized operation was found to be located between and include Milford and New Haven, Conn., a distance of about 15 miles. When WTIC is operated with 5 kilowatts and WEAF with 50 kw. their synchronous operation has made reception unintelligible in New Haven and surrounding territory both day and night, the ratio of the signals from these stations in the New Haven area being 2 to 1 and less.

Interference arising from the synchronous operation of WBAL and WJZ has not been as severe as that caused by WTIC-WEAF, due mainly to the greater geographical separation between WBAL and WJZ (approximately 143 miles) and the lesser power used. Station WJZ has always employed its full power of 30 kw. while the power of WBAL has varied between 10 kw. and 2½ kw. Recently WBAL's power, when synchronized, has been maintained at 10 kw. day and 2½ kw. night.

Observations made between Baltimore and Philadelphia when WBAL was operated with 10 kw. reveal that distortion due to synchronous operation in the daytime became noticeable at Havre de Grace and continued to Wilmington, Del., a distance of about 30 miles. For approximately 12 miles in the center of this area the distortion was so severe
as to render reception of the synchronized stations
34 unintelligible. Tests made while WBAL was using
2.6 kw. at nighttime reveal more widespread interference, distortion being experienced in South Philadelphia and vicinity as well as throughout the District of Columbia. The nighttime reception of both WBAL and WJZ in these areas was free from interference when the stations operated separately.

At all points where distortion due to synchronous operation was observed (either of WBAL-WJZ or WTIC-WEAF) the ratio of the strength of the signals from the two synchronizing stations was 4 to 1 or less. The actual tests and observations were made in limited areas but as the same interference exists wherever the signal ratio is less than 4 to 1 there are undoubtedly wide areas in which distortion results from the synchronous operation of these stations and the thickly populated New Haven and South Philadelphia areas can not be considered as the only territories in which satisfactory reception of the involved stations is rendered impossible by reason of their synchronous operation although such operation has, on the other hand, improved the reception of these stations in some localities.

There is no broadcast station situated in New Haven or vicinity, and while some service is received therein from WOR, WABC and WJZ, it appears that the only consistent and reliable service received in that city is that rendered by WEAF when that station is operating separately and not synchronized with WTIC. It necessarily follows that the synchronizing of WEAF with WTIC one-half time deprives the listeners in the New Haven area of a substantial portion of the best broadcast service now received. Although a reduction in the power of WTIC while synchronized would result in moving the distortion or interference area from New Haven toward Hartford the experiments of WTIC-WEAF have been conducted upon the theory that their ultimate outcome is partially dependent on the criticisms, complaints and other reports received from listeners affected thereby. In line with this policy the so-called "mush" area has been allowed to remain in New Haven and surrounding territory.

Baltimore and vicinity now receive good broadcast service from the following stations located therein, in addition to WBAL:

| | | |
|---|---|---|
| WCAO | 600 kc. | 250 watts |
| WCBM | 1,370 kc. | 250 L. S.<br>100 night |
| WFBR | 1,270 kc. | 500 watts |

In addition to the service rendered by WTIC, Hartford and vicinity now receive good service from WDRC, located therein, and operating on 1330 kc. with 500 watts power.

In addition to the foregoing, broadcast service is undoubtedly received in both Baltimore and Hartford from the various high powered stations situated elsewhere.

Although some evidence was introduced to the effect that the use of so-called volume antennas would eliminate much of the interference caused by the synchronous operation of these stations, it does not appear that the use of such receiving equipment would materially improve reception in those areas where distortion exists. Furthermore, while

the contemplated use of certain new equipment and
35 a reduction of from 5,000 to 4,000 cycles in the fre-
quency sent from the Bell Laboratories will probably
reduce the phase shifts in apparatus and rapid changes in the telephone lines, the distortion will not be eliminated by such proposed changes since only a small portion of the same is caused by such phase displacements and rapid changes.

By the Commission's plan of allocation, broadcast stations are divided into several classes, clear channel, regional and local. The service rendered by a clear channel station may be divided into four parts: (1) high grade city service which extends over an average radius of 75 miles, (2) high grade rural service which covers a radius of 160 miles, (3) intermittent rural service, a radius of 1,000 miles, and (4) occasional rural service which extends over varying greater distances. The services rendered by regional and local stations are restricted by interference, low power, and other factors to a much more limited area and do not extend over the vast rural areas which are served by clear channels.

In considering any two synchronized stations the area wherein a ratio of signal from the two is less than four to one can be controlled in general by the power of the stations, the geographical separation, the radiating system, and to some extent is affected by the intervening terrain. To be considered most satisfactory therefore, any plan of synchronization should be so arranged that the territory wherein the signal ratio is less than four to one should not fall in the good service areas of the stations being synchronized. Although it is the applicant's contention that the WTIC-WEAF and WBAL-WJZ experiments are ideal laboratories for the successful achievement of the entire synchronization problem, it does not appear from the evidence in this case that there is any reasonable assurance that the experiments of these stations if continued could be brought to a successful conclusion. On the other hand it appears that there are many serious problems existing in the synchronization field for which no solution has as yet been found or even contemplated and synchronization experiments on a whole may be considered to be in a preliminary state. Furthermore, it appears that such experiments could be conducted with many advantages on lower power stations with flexible, experimental installations not found in the high power, rigid installations represented by WTIC-WEAF and WBAL-WJZ.

### Grounds for Decision.

On the record in this case the Commission is of the opinion and so finds:

1. The synchronization experiments conducted by the stations involved in this proceeding have resulted in the impairment and reduction of a substantial portion of the good broadcast service otherwise received in several densely populated areas, and particularly in the City of New Haven and surrounding territory in which the service rendered by WEAF when operating separately is the best now received.

2. The contention advanced by applicants that the proposed use of certain new equipment and changes in methods of transmission and reception would result in substantial improvement in reception throughout the areas now suffering interference from synchronous operation is not
36 sustained by substantial evidence in this case. It
appears from the record, on the other hand, that serious and objectionable interference will still exist even though the proposed equipment were to function perfectly, since the solution of several of the causes for the interference arising from the synchronous operation of these stations has neither been found nor contemplated.

3. Synchronous operation of broadcast stations is in a preliminary stage and it appears from this record that experiments seeking its successful conclusion could be conducted with advantage over lower powered stations with more flexible installations and so located as to result in a minimum of inconvenience to radio listeners. The stations involved in the present experiments, namely, WTIC-WEAF and WBAL-WJZ, are regularly licensed to operate on clear channel assignments serving extensive and populous areas, and it does not appear that the ultimate achievement of successful synchronization depends upon the use of such stations for the conduct of experiments in this field.

4. Public interest, convenience and/or necessity would not be served by the granting of either of these applications.

## Order.

On consideration of the evidence in this case and the briefs filed by applicants and the respondent, it is accordingly ordered:

1. That the application of Travelers Broadcasting Service Corporation for continuation of authority to permit the experimental synchronous operation of Station WTIC with Station WEAF be, and the same is hereby, denied;

2. That the application of Consolidated Gas & Electric Light & Power Company of Baltimore for a continuation of authority to permit the experimental synchronous operation of station WBAL with station WJZ be, and the same is hereby, denied, and

3. That this order shall be effective June 15, 1932.

Brown, Commissioner, not participating.
Lafount, Commissioner, dissenting.

Filed May 27, 1932.

37 [Endorsed:] Court of Appeals, District of Columbia. Filed Apr. 13, 1933. Henry W. Hodges, Clerk.

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37*a* In the Court of Appeals of the District of Columbia.

No. 5939.

WGN, Inc., Appellants,

v.

Federal Radio Commission.

## *Federal Radio Commission's Statement Listing Interested Parties.*

In compliance with the provisions of Section 16 of the Radio Act of 1927, as amended July 1, 1930 (46 Stat. 844), the Federal Radio Commission lists herewith all persons, firms or corporations to whom it has mailed or otherwise delivered a copy of the Notice of Appeal filed in the above entitled cause.

| Call letters. | Licensees. |
|---|---|
| WBBM | WBBM Broadcasting Corporation, 410 N. Michigan Avenue, Chicago, Ill. |
| KFAB | KFAB Broadcasting Company, Cornhusker Hotel, 13th & M Sts., Lincoln, Nebr. |
| WMC | Memphis Commercial Appeal, Inc., 30 N. Second St., Memphis, Tenn. |
| WJR | WJR, The Good Will Station, Inc., 2800 Fisher Building, Detroit, Mich. |
| WEW | St. Louis University, 221 N. Grand Blvd., St. Louis, Mo. |

FEDERAL RADIO COMMISSION,
By HERBERT L. PETTEY,
*Secretary.*

37*b* [Endorsed:] No. 5939. In the Court of Appeals of the District of Columbia. WGN, Inc., Appellant, v. Federal Radio Commission. Federal Radio Commission's statement listing interested parties. Federal Radio Commission. George B. Porter, Acting General Counsel. Court of Appeals, District of Columbia. Filed Jul. 6, 1933. Henry W. Hodges, Clerk.

38 In the Court of Appeals of the District of Columbia.

No. 5939.

WGN, Inc., Appellant,

v.

Federal Radio Commission.

*Notice of Intention to Intervene and Statement of Interest.*

To the Honorable the Chief Justice and Associate Justices of the Court of Appeals of the District of Columbia:

Now come WBBM Broadcasting Corporation (Radio Station WBBM) and KFAB Broadcasting Company (Radio Station KFAB) and file this as their joint Notice of Intention to Intervene and Statement of Interest in the above entitled and numbered appeal.

In support of this Notice of Intention to Intervene, interveners respectfully show that they are interested in said cause for the following reasons:

1. On the 24th day of March, 1933, the Federal Radio Commission rendered its decision (Statement of Facts, and Grounds for Decision) and entered an order authorizing the WBBM Broadcasting Corporation and KFAB Broadcasting Company, licensees of Radio Broadcasting Stations WBBM, Chicago, Illinois, and KFAB, Lincoln, Nebraska, respectively, to install automatic frequency control equipment and to operate said stations simultaneously and in synchronism during the time approximately from 10 P. M. to midnight each day on an *experimental* basis.

2. Appellant in the above entitled and numbered appeal seeks to have this Honorable Court reverse the decision and order of the Federal Radio Commission 39 by which such experimental synchronous operation was authorized. If the Court should reverse the action of the Federal Radio Commission in granting and authorizing the simultaneous synchronous operation of Radio Stations WBBM and KFAB, such reversal would obviously adversely affect interveners by prohibiting them from engaging in such experimental synchronous operation.

Wherefore, as hereinbefore stated, interveners give this joint notice of intention to intervene in the above entitled cause and as notice that they will file briefs with this Honorable Court and, if permitted, join in the argument thereon before this Honorable Court.

WBBM BROADCASTING CORPORATION, AND
KFAB BROADCASTING COMPANY,
*Interveners,*

By PAUL D. P. SPEARMAN,
*Their Attorney.*

40 DISTRICT OF COLUMBIA,
*City of Washington, ss:*

Paul D. P. Spearman, after first being sworn, on oath deposes and says that he is attorney of record for the two interveners named in the attached and foregoing "Notice of Intention to Intervene and Statement of Interest"; that he has read said "Notice of Intention to Intervene and Statement of Interest" and that the allegations therein contained are true and correct to the best of his knowledge and belief.

PAUL D. P. SPEARMAN,

Subscribed and sworn to before me this the 17th day of April, A. D. 1933.

[Seal of Margaret S. Jarvis, Notary Public, District of Columbia.]

MARGARET S. JARVIS,
*Notary Public.*

Receipt of a copy of the attached "Notice of Intention to Intervene and Statement of Interest" is acknowledged this the 17th day of April, A. D. 1933.

WGN, INC.,
By LOUIS G. CALDWELL,
*Attorney for WGN.*
FEDERAL RADIO COMMISSION,
By RALPH L. WALKER,
*Assistant Counsel.*

41 [Endorsed:] Court of Appeals, District of Columbia. Filed Apr. 17, 1933. Henry W. Hodges, Clerk.

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42-46 Court of Appeals, District of Columbia. Filed May 12, 1933. Henry W. Hodges, Clerk.

In the Court of Appeals of the District of Columbia.

No. 5939.

WGN, Incorporated, Appellant,
v.
Federal Radio Commission.

*Statement in writing of the Facts and Grounds for the Decision of the Federal Radio Commission as Found and Given by It, Order of the Federal Radio Commission and Record in the Matter of the Applications of WBBM Broadcasting Corporation (WBBM) for Modification of License and Authority to Install Automatic Frequency Control, and the Applications of KFAB Broadcasting Company (KFAB) for Modification of License and Authority to Install Automatic Frequency Control.*

Comes now the Federal Radio Commission, pursuant to Section 16 of the Radio Act of 1927, as amended July 1, 1930 (46 Stat. 844), and files this, its Statement in Writing of the Facts and Grounds for Decision as found and given by it, its Order, and the Record before it on the hearing held November 14 to 17, 1932, on the applications of WBBM Broadcasting Corporation (WBBM) for modification of license and authority to install automatic frequency control, and the applications of KFAB Broadcasting Company (KFAB) for modification of license and authority to install automatic frequency control.

FEDERAL RADIO COMMISSION,
By HERBERT L. PETTEY,
*Secretary.*

* * * * * * *

47 FRC Form No. 301.

2355

4-ML-B-980. File No. 543. Call letters: WBBM-WJBT.

United States of America, Federal Radio Commission.

Application for Modification of Radio Broadcast Station License.

(Submit in duplicate to Supervisor of Radio in charge of district in which station is located. Swear to one copy.)

To the Federal Radio Commission:

1. Name of applicant:* WBBM Broadcasting Corporation.

2. Post office address: State, Illinois; City, Chicago; Street and number, 410 North Michigan Avenue.

3. Application is hereby made for modification of license No. 4-R-B-543, dated January 12, 1932, with call letters WBBM, as follows: (*a*) Frequency, 770 kilocycles; (*b*) Power:† (1) Night, 25 kilowatts; (2) Day, 25 kilowatts; (*c*) Hours of operation, See attached sheet; (*d*) Location of main studio, No change; (*e*) ——.

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*Name must be identical with that used in existing license.

†If any construction is contemplated, application for construction permit must be filed.

### 48 *Hours Which it is Requested That Stations WBBM and KFAB be Allowed to Operate Syncronously.*

February, March and April.

| | |
|---|---|
| Mondays, | 6:45 P. M. to 8:00 P. M. and 10:00 P. M. to 11:15 P. M. |
| Tuesdays, | 6:45 P. M. to 8:00 P. M. and 10:00 P. M. to 11:15 P. M. |
| Wednesdays, | 6:45 P. M. to 8:00 P. M. and 10:00 P. M. to 11:15 P. M. |
| Thursdays, | 6:45 P. M. to 8:00 P. M. and 10:00 P. M. to 11:15 P. M. |
| Fridays, | 6:45 P. M. to 8:00 P. M. and 10:00 P. M. to 11:15 P. M. |
| Saturdays, | 6:00 P. M. to 8:00 P. M. and 10:00 P. M. to 11:15 P. M. |
| Sundays, | 6:45 P. M. to 8:00 P. M. and 10:00 P. M. to 11:00 P. M. |

May.

9:00 P. M. to 11:00 P. M. Daily.

June and July.

9:00 P. M. to 10:30 P. M. Daily.

4. State the objects to be obtained by the modification of license for which this application is made. Syncronous operation of WBBM and KFAB during hours shown on attached sheet.

5. Does the application directly request the assignment of all or any part of the facilities (i. e., frequency, power, and/or hours of operation) now assigned to any other station or stations? No. If so, specify the station or stations and the facilities requested to be withdrawn therefrom. ——.

49 6. The applicant's last application for station license is to be considered as part of this application, and the truth of the statements therein contained is hereby reaffirmed except insofar as the contrary expressly appears in this application.

7. The applicant waives any claim to the use of any particular frequency or of the ether as against the regula-

tory power of the United States because of the previous use of the same, whether by license or otherwise, and requests a station license in accordance with this application.

Dated this 24th day of March, 1932.

WBBM BROADCASTING CORPORATION,
*Applicant.*
By JOHN M. LITTLEPAGE,
*Attorney-in-Fact.*

District of Columbia,
*City of Washington, ss:*

John M. Littlepage, being first duly sworn, affirmed, according to law, upon his oath, deposes and says that he is the Attorney-in-fact (if applicant is not an individual, state relation of affiant to applicant) for above-named applicant, and that the facts stated in the foregoing application and all exhibits attached thereto are true of his own knowledge, except as to such statements as are therein stated to be on information and belief, and as to such statements he believes them to be true.

JOHN M. LITTLEPAGE,
(*Affiant.*)

Subscribed and sworn to before me this 24th day of March, 1932.

MARGARET S. JARVIS,
*Notary Public.*

My commission expires May 10, 1934.

50 F. R. C. Form No. 305.

2360.

File No. 4-FB-187. Call Letters: WBBM.

United States of America, Federal Radio Commission.

*Application for Authorization to Install Automatic Frequency Control.*

(Submit in duplicate to Supervisor of Radio in charge of district in which station is located. Swear to one copy.)

To the Federal Radio Commission:

1. Name of applicant:* WBBM Broadcasting Corporation.

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*Name must be identical with that used in existing license.

2. Post office address: State, Illinois; City, Chicago; Street and number, 410 North Michigan Avenue.

3. Location of transmitter: State, Illinois; County, Cook; City or town, Glenview; Street and number, R. F. D. #1, Shermerville Road.

4. Existing license authorizes the use of the following: (*a*) Call letters, WBBM; (*b*) Frequency, 770 k. c.; (*c*) Power: Night, 25 Kilowatts; Day, 25 Kilowatts.

5. Description of present transmitting apparatus: (*a*) Make, Composite; Type No., ——; (*b*) Oscillator: Type of circuit, Piezo Electric; Number and type of tubes, 1-UX210; (*c*) List intermediate power amplifier stages by number and type of tubes in each stage: 1-UX865, 1-UX860, 1-UX860, 2-204A, 1-WE22OB; (*d*) Last radio stage: Number and type of tubes, 4-WE232A; (*e*) Modulator or last audio stage: Number and type of tubes, 1-UV848; (*f*) Which radio stage is modulated? Fourth; (*g*) What system of modulation is employed (high level, low level, grid bias in last radio stage, etc.)? low level; (*h*) If low level modulation is employed, state number and type of tubes in modulated radio stage: 1-WE220B; (*i*) Maximum rated carrier power of transmitter as determined by orders of the Federal Radio Commission is 35 kilowatts.

51 6. Description of proposed equipment: (*a*) Will automatic frequency control unit be composite or purchased as a unit? Unit; (*b*) If purchased as a unit, give name of manufacturer: Western Electric Co.; If composite, from whom will crystal be purchased? ——; (*c*) By whom will unit be calibrated? Bell Telephone Laboratories; Calibrated frequency: 770 kilocycles at — degrees Fahrenheit, or 60 degrees Centigrade; Proposed operating frequency: 770 kilocycles (Give exact figure, correct to third decimal place) at — degrees Fahrenheit, or 60 degrees Centigrade; (*d*) State guaranteed accuracy of the calibration: I 10 cycles; (*e*) Oscillator: Type (such as piezo electric, tuning fork, etc.), Piezo electric; (*f*) Type of tube (or tubes) in oscillator: W. E¾ 271A; Normal plate current, .o10A, plate voltage, 135; (*g*) State number of frequency control oscillators which will be maintained constantly at correct operating temperature and frequency in the heat-controlled chamber: 2 in separate heat-controlled chambers; (*h*) Is provision made for instantaneous connection of spare frequency control units? Yes; (*i*) Manufacturer's name and

type of automatic temperature control: W. E. 700-A Oscillator; (*j*) State within what limit automatic temperature control will hold the temperature: — Degrees Fahrenheit or .14 degrees Centigrade: With ambient between 18.5° C. and 46° C.; (*k*) State temperature coefficient of the frequency control units: — cycles per degree Fahrenheit, or .5 cycles per degree Centigrade; (*l*) Is temperature coefficient positive or negative? Positive; (*m*) Describe checking means used for determining if transmitter retains assigned frequency: Automatically and continuously corrected to agree with standard frequency furnished by the Bell System over wire lines.

52 *Synchronized Crystal Oscillator Equipment for Common Frequency Broadcasting,* 1231-*A and* 1232-*A Panels.*

The Western Electric synchronized crystal oscillator equipment for common frequency broadcasting consists essentially of a stable quartz piezo-electric oscillator, operating at the required carrier frequency and controlled to a high degree of precision by means of a relatively low standard reference frequency (4000 cycles), which is transmitted to the stations involved by means of suitable wire lines. Such a system combines the high inherent stability and freedom from short period variations and interruptions of the independent oscillator with the extremely high average accuracy afforded by a wire connection to a master frequency standard since the carrier generated by the local crystal oscillator is continuously compared with, and automatically corrected to the broadcast frequency derived from the reference frequency.

The synchronized crystal equipment is designed to replace the master oscillator of the radio transmitter of the broadcasting station. It is connected to the radio transmitter by means of a small shielded radio frequency transmission line which is capable of delivering approximately 2 watts. The necessary apparatus is mounted on two racks designated as the 1231-A and 1232-A Panels which are fitted with protective locker-type covers.

The right-hand rack, or the 1232-A Panel, contains the control equipment necessary to maintain the carrier frequency precisely at the assigned value. The first section of

this assembly contains the wire terminating equipment, the reference frequency amplifier, and the first stage of the frequency multiplier. This multiplier is driven at the fundamental reference frequency of 4 kc. so as to produce the fifth harmonic, or 20 kc., in the output circuit. The 20 kc. output is used in the next section to control a 10 kc. multi-vibrator which comprises the final frequency multiplier stage. The output of the multi-vibrator contains not only the fundamental frequency but also all the harmonics of it up through the broadcast frequency range. The 10 kc. fundamental and the radio frequency harmonics in the output are amplified separately in this section. The harmonic selector and detector comprising the next section of the rack assembly is used to select and amplify the harmonic which is 10 kc. lower in frequency than the carrier frequency. The carrier frequency from the transmitter, which may be assumed to differ from its assigned frequency
53 by the infinitesimal amount $\Delta f$ is also fed into the detector of this selector so that the output of the detector is 10 kc. + $\Delta f$. This 10 kc. + $\Delta f$ frequency, together with the amplified 10 kc. reference frequency from the multi-vibrator unit, constitutes the input to the two balanced modulators contained in the last section of the rack. The 10 kc. reference frequency applied to one of these modulators is passed through a phase shifting network which advances its phase by 90°. The output of each modulator therefore becomes one phase of a two phase alternating current of the frequency $\Delta f$. This two phase current has a direction of phase rotation which depends directly upon whether the carrier frequency is above or below its assigned frequency.

The left-hand rack assembly, or the 1231-A Panel, contains duplicate frequency corrector units and crystal oscillators (one spare set) and a two stage radio frequency buffer amplifier, the output of which is connected to the radio transmitter.

The frequency corrector unit consists essentially of a small reversing motor energized by the output from the modulator unit and mechanically connected to a small auxiliary variable condenser associated with the crystal oscillator circuit. This control operates in such a manner that any drift in the oscillator frequency is promptly corrected and the latter is held to the assigned value with a high degree of precision. Each crystal and holder is mounted in an insulated chamber with thermostatic heat control capable of maintaining the temperature of the crystal constant within extremely narrow limits. The spare crystal oscillator is complete with its own frequency control unit and provision is made for keeping the spare crystal operating at its operating temperature at all times, so that in the event of a failure, no warming up period is required before placing it into service.

A voltage regulator is included in the 1231-A Panel and prevents shifts in the operating frequency of the crystals arising from variations in the power supply voltage. The equipment comprising the two panel units is entirely self-contained requiring only a power supply connection to the alternating current service of the broadcasting station.

The operation of the synchronized crystal oscillators is such that if synchronized and then left without control, they may drift slowly apart by an amount which is limited to a few cycles per second over a period of several hours. Their performance will be substantially independent of short period transient variations in the reference fre-
54–60 quency or of the effects of any interference which may be received along with the reference frequency, such as slight phase variations which would otherwise be greatly multiplied. The use of crystal oscillators also affords insurance against station shut-down due to failure of the synchronizing apparatus or of the reference frequency. In such an emergency, the equipment will continue to supply a carrier which will not drift from the synchronized value by an amount sufficient to cause undesirable effects at the receiver for a considerable period of time. As soon as normal conditions are restored, synchronization will be effected promptly and automatically.

* * * * * * *

61 6. Description of proposed equipment—Continued:

(*n*) State manufacturer's name and rated accuracy of: Thermostat, W. E. K. S. 7104; thermometer, ——; (*o*) Buffer stage: Type of tube, WE 259-A; Plate current, .005

amperes; plate voltage, 135; (*p*) List all intermediate amplifier stages by number and type and power rating of tubes: WE271A, 1-UX865, 1-UX860, 1-UX860, 2-204A, 1-WE220B;

No change.

(*q*) Last radio stage: Type and number of tubes, 4 W. E. 232A; Normal operating: Night plate current per tube, ——; Plate voltage, ——; Day plate current per tube, ——; Plate voltage, ——; (*r*) Modulator or last audio stage: Type and number of tubes 1-UV848; Normal plate current per tube, ——; Plate voltage, ——; (*s*) Which radio stage is modulated? Fourth; (*t*) What system of modulation is employed (high level, low level, grid bias in last radio stage, etc.)? Low level; (*u*) If low level modulation is employed, give for modulated radio stage: Type and number of tubes, 1 WE220B; Plate current (per tube), ——; Plate voltage, ——; (*v*) Maximum percentage of modulation, 100%; How is this determined? Oscillograph; What modulation measuring device is used? ——; (*w*) Maximum rated carrier power of transmitter as determined by orders of the Federal Radio Commission: 35 Kilowatts.

7. Applicant represents that the attached are: (1) An accurate schematic diagram of the fundamental radio circuit of the proposed frequency control, including the type and number of tubes; (2) complete mechanical drawing or sketch, of heat-controlled chamber, showing number and material of the various layers of the box, position of component parts, dimensions, etc.

(These should be blue prints or ink drawings and, if possible, the size of this application and attached hereto.)

8. Cost of proposed equipment: $8,000.

9. If application is granted, the installation will be commenced within 30 days of date on which applicant is notified thereof and will be completed and ready for operation within 60 days thereafter.

10. Will installation of automatic frequency control necessitate discontinuance of operation on regular schedule? No. If so, for what length of time? ——.

62 11. Applicant represents that the equipment herein described, if installed, will maintain frequency of

the transmitter within one cycle of the assigned frequency continuously, and requests authorization to install the same.

Dated this 24th day of March, 1932.

WBBM BROADCASTING CORPORATION,
By JOHN M. LITTLEPAGE,
*Attorney-in-fact.*

District of Columbia,
*City of Washington, ss:*

John M. Littlepage, being first duly sworn, upon his oath, deposes and says that he is the (If applicant is not an individual, state relation of affiant to applicant) Attorney-in-fact for the above-named applicant, and that the facts stated in the foregoing application and all exhibits attached thereto are true of his own knowledge, except as to such statements as are therein stated to be on information and belief, and as to such statements he believes them to be true.

JOHN M. LITTLEPAGE,
*Affiant.*

Subscribed and sworn to before me this 24th day of March, 1932.

MARGARET S. JARVIS,
*Notary Public.*

My commission expires May 10, 1934.

63 FRC Form No. 301.

2358.

4-ML-B-981. File No. 681. Call letters KFAB.

United States of America, Federal Radio Commission.

*Application for Modification of Radio Broadcast Station License.*

(Submit in duplicate to Supervisor of Radio in charge of district in which station is located. Swear to one copy.)

To the Federal Radio Commission:

1. Name of applicant:* KFAB Broadcasting Company.
2. Post office address: State, Nebraska; City, Lincoln; Street and number, 13th and M Streets.

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*Name must be identical with that used in existing license.

3. Application is hereby made for modification of license No. 4-R-B-681, Dated January 26, 1932, with call letters KFAB, as follows: (*a*) Frequency, 770 kilocycles; (*b*) Power:† (1) Night, 5 kilowatts; (2) Day, 5 kil*l*owatts; (*c*) Hours of operation, See attached sheet; (*d*) Location of main studio, No change; (*e*) ——.

4. State the objects to be obtained by the modification of license for which this application is made: Synchronous operation of WBBM and KFAB during hours shown on attached sheet.

5. Does the application directly request the assignment of all or any part of the facilities (i. e., frequency, power, and/or hours of operation) now assigned to any other station or stations? No. If so, specify the station or stations and the facilities requested to be withdrawn therefrom: ——.

64 *Hours Which it is Requested That Stations WBBM and KFAB be Allowed to Operate Synchronously.*

### February, March, and April.

| | |
|---|---|
| Mondays, | 6:45 P. M. to 8:00 P. M. and 10:00 P. M. to 11:15 P. M. |
| Tuesdays, | 6:45 P. M. to 8:00 P. M. and 10:00 P. M. to 11:15 P. M. |
| Wednesdays, | 6:45 P. M. to 8:00 P. M. and 10:00 P. M. to 11:15 P. M. |
| Thursdays, | 6:45 P. M. to 8:00 P. M. and 10:00 P. M. to 11:15 P. M. |
| Fridays, | 6:45 P. M. to 8:00 P. M. and 10:00 P. M. to 11:15 P. M. |
| Saturdays, | 6:00 P. M. to 8:00 P. M. and 10:00 P. M. to 11:15 P. M. |
| Sundays, | 6:45 P. M. to 8:00 P. M. and 10:00 P. M. to 11:00 P. M. |

### May.

9:00 P. M. to 11:00 P. M. Daily.

### June and July.

9:00 P. M. to 10:30 P. M. Daily.

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†If any construction is contemplated, application for construction permit must be filed.

65 6. The applicant's last application for station license is to be considered as part of this application, and the truth of the statements therein contained is hereby reaffirmed except insofar as the contrary expressly appears in this application.

7. The applicant waives any claim to the use of any particular frequency or of the ether as against the regulatory power of the United States because of the previous use of the same, whether by license or otherwise, and requests a station license in accordance with this application.

Dated this 24th day of March, 1932.

KFAB BROADCASTING COMPANY,
*Applicant,*

By JOHN M. LITTLEPAGE,
*Attorney-in-fact.*

DISTRICT OF COLUMBIA,
*City of Washington, ss:*

John M. Littlepage, being first duly sworn, upon his oath deposes and says that he is the (If applicant is not an individual, state relation of affiant to applicant) Attorney in Fact for above-named applicant, and that the facts stated in the foregoing application and all exhibits attached thereto are true of his own knowledge, except as to such statements as are therein stated to be on information and belief, and as to such statements he believes them to be true.

JOHN M. LITTLEPAGE,
*(Affiant.)*

Subscribed and sworn to before me this 24th day of March, 1932.

[SEAL.] MARGARET S. JARVIS,
*Notary Public.*

My commission expires May 10, 1934.

66 [Stamp:] Federal Radio Commission, License Division, Mar. 28, 1932.

F. R. C. Form No. 305.

2359.

File No. 4-F-B-188. Call Letters: KFAB.

United States of America, Federal Radio Commission.

### *Application for Authorization to Install Automatic Frequency Control.*

(Submit in duplicate to Supervisor of Radio in charge of district in which station is located. Swear to one copy.)

To the Federal Radio Commission:

1. Name of applicant:* KFAB Broadcasting Company.

2. Post office address: State, Nebraska; City, Lincoln; Street and number, 13th & M Streets.

3. Location of transmitter: State, Nebraska; County, Lancaster; City or town, Lincoln; Street and number, 17th & Holdrege Streets.

4. Existing license authorizes the use of the following: (*a*) Call letters, KFAB; (*b*) Frequency, 770 k.c.; (*c*) Power: Night, 5 kilowatts; Day, 5 kilowatts.

5. Description of present transmitting apparatus: (*a*) Make, Composite; Type No. ——; (*b*) Oscillator: Type of circuit, Piezo Electric; Number and type of tubes, 1-UV210; (*c*) List intermediate power amplifier stages by number and type of tubes in each stage: 1-UX865, 1-UX210, 1-211D, 3-212D; (*d*) Last radio stage: Number and type of tubes, 4-228A; (*e*) Modulator or last audio stage: Number and type of tubes, 1-228A; (*f*) Which radio stage is modulated? Fourth; (*g*) What system of modulation is employed (high level, low level, grid bias in last radio stage, etc.)? Low level; (*h*) If low level modulation is employed, state number and type of tubes in modulated radio stage: 3-212D; (*i*) Maximum rated carrier power of transmitter as determined by orders of the Federal Radio Commission is 5 kilowatts.

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*Name must be identical with that used in existing license.

67-78 6. Description of proposed equipment: (*a*) Will automatic frequency control unit be composite or purchased as a unit? Unit; (*b*) If purchased as a unit, give name of manufacturer: W. E. Co.; If composite, from whom will crystal be purchased? ——; (*c*) By whom will unit be calibrated? Bell Telephone Laboratories; Calibrated frequency: 770 kilocycles at — degrees Fahrenheit or 60 degrees Centigrade; Proposed operating frequency: 770 kilocycles (Give exact figure, correct to third decimal place) at — degrees Fahrenheit, or 60 degrees Centigrade; (*d*) State guaranteed accuracy of the calibration: I 10 cycles; (*e*) Oscillator: Type (such as piezo electric, tuning fork, etc.), Piezo electric; (*f*) Type of tube (or tubes) in oscillator: W. E. 271A; Normal plate current, .o10A; plate voltage, 135; (*g*) State number of frequency control oscillators which will be maintained constantly at correct operating temperature and frequency in the heat-controlled chamber: Two in separate heat-controlled chambers; (*h*) Is provision made for instantaneous connection of spare frequency control units? Yes; (*i*) Manufacturer's name and type of automatic temperature control: W. E. 700A Oscillator; (*j*) State within what limit automatic temperature control will hold the temperature: —— degrees Fahrenheit or .14 degrees Centigrade, with ambient temp. between 18.5° C. & 46° C.; (*k*) State temperature coefficient of the frequency control units: — cycles per degree Fahrenheit, or .5 cycles per degree Centigrade; (*l*) Is temperature coefficient positive or negative? Positive; (*m*) Describe checking means used for determining if transmitter retains assigned frequency: Automatically and continuously corrected to agree with standard frequency furnished by the Bell System over wire lines.

* * * * * * *

79 6. Description of proposed equipment—Continued: (*n*) State manufacturer's name and rated accuracy of: Thermostat, W. E. K. S. 7104; thermometer, none; (*o*) Buffer stage: Type of tube, W. E. 259A; Plate current, .005A; plate voltage, 135; (*p*) List all intermediate amplifier stages by number and type and power rating of tubes: 1-W. E., 271A, 1-UX210, 1-2110, 3-212D;

Change.

(*q*) Last radio stage: Type and number of tubes, 4-228A; Normal operating: Night plate current per tube, ——; Plate voltage, ——; Day plate current per tube, ——; plate voltage, ——; (*r*) Modulator or last audio stage: Type and number of tubes, ——; Normal plate current per tube, ——; Plate voltage, ——; (*s*) Which radio stage is modulated? ——; (*t*) What system of modulation is employed (high level, low level, grid bias in last radio stage, etc.)? ——; (*u*) If low level modulation is employed, give for modulated radio stage: Type and number of tubes, ——; Plate current (per tube), ——; Plate voltage, ——; (*v*) Maximum percentage of modulation, ——; How is this determined? ——; What modulation measuring device is used? ——; (*w*) Maximum rated carrier power of transmitter as determined by orders of the Federal Radio Commission: —— watts.

7. Applicant represents that the attached are: (1) An accurate schematic diagram of the fundamental radio circuit of the proposed frequency control, including the type and number of tubes; (2) complete mechanical drawing, or sketch, of heat-controlled chamber, showing number and material of the various layers of the box, position of component parts, dimensions, etc.

(These should be blue prints or ink drawings and, if possible, the size of this application and attached hereto.)

8. Cost of proposed equipment: $8,000.

9. If application is granted, the installation will be commenced within 30 days of date on which applicant is notified thereof and will be completed and ready for operation within 60 days thereafter.

10. Will installation of automatic frequency control necessitate discontinuance of operation on regular schedule? ——; If so, for what length of time? ——.

80 11. Applicant represents that the equipment herein described, if installed, will maintain frequency of the transmitter within one cycle of the assigned frequency continuously, and requests authorization to install the same.

Dated this 24th day of March, 1932.

KFAB BROADCASTING COMPANY,
By JOHN M. LITTLEPAGE,
*Attorney-in-Fact.*

District of Columbia,
*City of Washington, ss:*

John M. Littlepage, being first duly sworn, upon his oath deposes and says that he is the (If applicant is not an individual, state relation of affiant to applicant) Attorney in Fact for the above-named applicant, and that the facts stated in the foregoing application and all exhibits attached thereto are true of his own knowledge, except as to such statements as are therein stated to be on information and belief, and as to such statements he believes them to be true.

JOHN M. LITTLEPAGE,
*Affiant.*

Subscribed and sworn to before me this 24th day of March, 1932.

[SEAL.] MARGARET S. JARVIS,
*Notary Public.*

My commission expires May 10, 1934.

81 & 82 Federal Radio Commission, Washington, D. C.

Report No. 421.

*Daily Report of Broadcasting Applications Received.*

March 30, 1932.

* * * * * * *

| File No. | Name and studio location. | Call letters. | Nature of application. |
|---|---|---|---|
| 4-ML-B-980 | WBBM Broadcasting Corporation, Chicago, Ill. | WBBM-WJBT | Modification of license to synchronize with station KFAB during specified night hours. |
| 4-F-B-187 | Ditto........... | WBBM-WJBT | Install automatic frequency control. |
| 4-ML-B-981 | KFAB Broadcasting Company, Lincoln, Nebraska. | KFAB | Modification of license to synchronize with station WBBM - WJBT during specified night hours. |
| 4-F-B-188 | Ditto........... | KFAB | Install automatic frequency control. |

* * * * * * *

83 *Minutes of the Federal Radio Commission.*

Minute #554, May 24, 1932, 10:30 a. m.

Present: Commissioners Saltzman, Chairman, Sykes, Starbuck and Brown.

* * * * * * *

Applications Designated for Hearing.

The Commission designated the following applications for hearing:

| File No. | Applicant. | Call letters. | Nature of application. |
|---|---|---|---|
| 4-ML-B-980 | WBBM Broadcasting Corp., Chicago, Ill. | WBBM-WJBT | Modification of license to install new synchronization equipment and operate synchronously at night during hours that KFAB is now licensed to operate. |
| 4-F-B-187 | Same applicant....... | WBBM-WJBT | Installation of automatic Frequency Control. |
| 4-ML-B-981 | KFAB Broadcasting Co., Lincoln, Nebraska. | KFAB | Modification of License same request as 4-ML-B-980. |
| 4-F-B-188 | Same applicant....... | KFAB | Installation of Automatic Frequency Control. |

* * * * * * *

84-86 Federal Radio Commission, Washington, D. C.

Report No. 43.

*Decisions of the Commission.*

May 24, 1932.

The Commission today took the following action:

* * * * * * *

Set for Hearing.

* * * * * * *

87

| | | |
|---|---|---|
| WBBM-WJBT | WBBM Broadcasting Corp., Chicago, Ill. | Requests Mod. of Lic. to synchronize with KFAB during certain specified hours; and auth. to install automatic freq. control. |
| KFAB | KFAB Brdcstg. Co., Lincoln, Neb. | Requests Mod. of Lic. to synchronize with WBBM-WJBT during certain specified hours, and auth. to install automatic freq. control. |

* * * * * * *

(Copy.)

Federal Radio Commission, Washington, D. C.

*Notice.*

File Nos. 4-ML-B-980 & 4-F-B-187. Docket Nos. 1669 & 1668.

In re Application of WBBM Broadcasting Corporation, Dated 3/24/32, for Mod. Lic. & to Install Automatic Freq. Control. Location: Chicago, Ill. Operating Assignment Specified: Frequency, 770 Kc.; Power, 25 Kw.; Hours of Operation, To Synchronize with KFAB During Certain Specified Night Hrs. (in Addition to Present License).

To —— ——:

You are hereby notified that the Commission has examined the above described application and has designated the matter for hearing for the following reasons:

(1) To determine whether interference will be produced by the operation of WBBM and KFAB, as proposed by the applicant;

(2) To determine what effect said interference, if produced, will have upon the service of the stations involved, particularly in the rural service area;

(3) To determine whether the public interest, convenience and/or necessity would be served by authorizing these stations to operate in synchronism upon the clear channel frequency now authorized—namely 770 kc., and whether said stations should be granted regular or experimental authorizations;

(4) To determine the effect of synchronization, if authorized, particularly as to frequency maintenance and modulation with reference to the established principles of allocation, quota charges to be made and reception to the public in the areas of the stations such as the good, "mush" and long distance rural areas;

(5) To determine whether the applications may be granted, in view of the provisions of Section 9 of the Radio Act of 1927, as amended by the Act of March 28, 1928, and the Commission's regulations pursuant thereto;

(6) To determine the need for additional service in the immediate area now served by these stations and whether any service will be deprived to listeners in their normal service areas;

(7) To determine whether public interest, convenience and/or necessity would be served by the granting of the applications.

The attention of the applicant is directed to the fact that while his application constitutes a part of the record, it is not a part of the testimony and he should be prepared, at the hearing, to introduce testimony to prove the allegations contained in his application.

The specific grounds mentioned are not to be considered as exclusive of other grounds for the action and eventual decision of the Commission.

89 Attention is invited to par. 48, subparagraphs b, c, and e, of the Rules and Regulaions of the Federal Radio Commission, which are as follows:

b. In order to avail himself of the opportunity to be heard, the applicant shall, within 20 days of the mailing of the notice by the Secretary, file with the Commission a written appearance consisting of a statement of his desire to be heard together with a terse yet complete statement in writing of the facts which he expects to prove at such hearing, which statement shall not be taken as evidence of the facts therein stated. When filed with the Commission, such documents shall be accompanied by an affidavit showing that copies thereof have been served upon or mailed to all other parties notified of the hearing.

c. In case no appearance or statement in writing of the facts to be proved upon such hearing is filed by the applicant within the time so specified (or any extension thereof as the Commission may grant upon proper showing), the applicant will be defaulted and the application denied without a hearing and the Secretary shall so notify the other parties to the hearing.

e. If at the date set for hearing, either originally or as a result of continuances, the applicant does not appear and offer evidence in support of his said application, a default will be entered and the Commission will deny the application.

Attention is also called to the following: Rules and Regulations of the Federal Radio Commission, paragraphs 51, 52, 53, 54, 55, 60, 61, 63, 64, and such other of said rules as may be applicable.

A copy of the Rules and Regulations of the Federal Radio Commission may be obtained from the Superintendent of Documents, Washington, D. C., for a charge of forty-five cents a copy.

90 The Commission has fixed a time and place for a hearing on said application on August 18, 1932, at the hour of 10:00 A. M., at the offices of the Commission, Washington, D. C.

Notices of the hearing in this matter are, on the date below stated, being mailed to the following parties:

WBBM Broadcasting Corp. (WBBM-WJBT), Applicant, 410 N. Michigan Avenue, Chicago, Ill.

KFAB Broadcasting Co. (KFAB), Station assigned to 770 kc. frequency, Cornhusker Hotel, 13th & M Sts., Lincoln, Nebr.

St. Louis University (WEW), Station assigned to 760 kc. frequency, 221 N. Grand Blvd., St. Louis, Mo.

Memphis Commercial Appeal, Inc. (WMC), Station assigned to 780 kc. frequency, 30 N. Second Street, Memphis, Tenn.

WJR, The Goodwill Station, Inc. (WJR), Station assigned to 750 kc. frequency, 2800 Fisher Bldg., W. Grand & Second Blvds., Detroit, Michigan.

If for any reason the applicant does not desire a hearing, he should notify the Secretary immediately so that notices sent to other parties may be cancelled.

Dated at Washington, D. C., July 20, 1932.

FEDERAL RADIO COMMISSION.
JAMES W. BALDWIN,
*Secretary.*

MBA-JRB.

91 Federal Radio Commission, Washington, D. C.

*Notice.*

File Nos. 4-ML-B-981 & 4-F-B-188. Docket Nos. 1670, & 1671.

In re Application of KFAB Broadcasting Company, Dated March 24, 1932, for Modification of License and Automatic Frequency Control. Location: Lincoln, Nebr. Operating Assignment Specified: Frequency, 770 Kc.; Power, 5 Kw.; Hours of operation, simultaneous day operation with WBBM-WJBT, sharing night & synchronizing during certain specified night hours.

To —— ——:

You are hereby notified that the Commission has examined the above described application and has designated the matter for hearing for the following reasons:

(1) To determine whether interference will be produced by the operation of the stations, as proposed by the applicant;

(2) To determine what effect sa*di* interference, if produced, will have upon the service of the stations involved, particularly in the rural service area;

(3) To determine whether the public interest, convenience and/or necessity would be served by authorizing these stations to operate in synchronism upon the clear channel frequency now authorized, namely, 770 kc., and whether said stations should be granted regular or experimental authorizations;

(4) To determine the effect of synchronization, if authorized, particularly as to frequency maintenance and modulation with reference to the established principles of allocation, quota charges to be made and reception to the public in the areas of the stations such as the good, "mush" and long distance rural areas;

(5) To determine whether the applications may be granted, in view of the provisions of Section 9 of the Radio Act of 1927, as amended by the Act of March 28, 1928, and the Commission's regulations pursuant thereto;

(6) To determine the need for additional service in the immediate area now served by these stations and whether any service will be deprived to listeners in their normal service areas;

(7) To determine whether public interest, convenience and/or necessity would be served by the granting of the applications.

The attention of the applicant is directed to the fact that while his application constitutes a part of the record, it is not a part of the testimony and he should be prepared, at the hearing, to introduce testimony to prove the allegations contained in his application.

The specific grounds mentioned are not to be considered as exclusive of other grounds for the action and eventual decision of the Commission.

92 Attention is invited to par. 48, subparagraphs b, c, and e, of the Rules and Regulations of the Federal Radio Commission, which are as follows:

b. In order to avail himself of the opportunity to be heard, the applicant shall, within 20 days of the mailing of the notice by the Secretary, file with the Commission a written appearance consisting of a statement of his desire to be heard together with a terse yet complete statement in writing of the facts which he expects to prove at such hearing, which statement shall not be taken as evidence of the facts therein stated. When filed with the Commission, such documents shall be accompanied by an affidavit showing that copies thereof have been served upon or mailed to all other parties notified of the hearing.

c. In case no appearance or statement in writing of the facts to be proved upon such hearing is filed by the applicant within the time so specified (or any extension thereof as the Commission may grant upon proper showing), the applicant will be defaulted and the application denied without a hearing and the Secretary shall so notify the other parties to the hearing.

e. If at the date set for hearing, either originally or as a result of continuances, the applicant does not appear and offer evidence in support of his said application, a default will be entered and the Commission will deny the application.

Attention is also called to the following: Rule and Regulations of the Federal Radio Commission, paragraphs 51, 52, 53, 54, 55, 60, 61, 63, 64, and such other of said rules as may be applicable.

A copy of the Rules and Regulations of the Federal Radio Commission may be obtained from the Superintendent of Documents, Washington, D. C., for a charge of forty-five cents a copy.

93 The Commission has fixed a time and place for a hearing on said application on August 18, 1932, at the hour of 10:00 A. M., at the offices of the Commission, Washington, D. C.

Notices of the hearing in this matter are, on the date below stated, being mailed to the following parties:

KFAB Broadcasting company, Applicant, Cornhusker Hotel, Lincoln, Nebr.

St. Louis University (WEW), Station assigned to 760 kc. frequency, 221 North Grand Blvd., St. Louis, Missouri.

WJB, The Goodwill Station Inc., Station assigned to 760 kc. frequency, 2300 Fisher Bldg., W. Grand & Second Blvd., Detroit, Michigan.

WBBM Broadcasting Corp. (WBBM-WJBT) Station assigned to 770 kc. frequency, 410 North Michigan Ave., Chicago, Ill.

Memphis Commercial Appeal Inc. (WMC), Station assigned to 760 kc. frequency, 30 North Second St., Memphis, Tenn.

If for any reason the applicant does not desire a hearing, he should notify the Secretary immediately so that notices sent to other parties may be cancelled.

Dated at Washington, D. C., July 19, 1932.

FEDERAL RADIO COMMISSION.

——— ———,

*Secretary.*

94 [Stamp:] Federal Radio Comm., Aug. 25, 1932, Received 1st Mail, Mail and Files.

Before the Federal Radio Commission.

File Nos. 4-ML-B-980 & 4-F-B-187. Docket Nos. 1669 & 1668.

In re Application of WBBM Broadcasting Corporation, Chicago, Illinois, for Modification of License and to Install Automatic Frequency Control.

*Notice of Desire to be Heard.*

To the Honorable Federal Radio Commission:

Now comes WBBM Broadcasting Corporation, by its attorney, and gives this its notice of desire to be heard as required by the rules and regulations of the Federal Radio Commission on the above numbered applications.

## Statement of Facts to be Proved at the Hearing.

At the hearing on the above numbered applications, applicant will introduce evidence to show:

1. That no objectionable interference will be produced by the operation of WBBM and KFAB as proposed.
2. That the granting of these applications will result in a better service to a greater number of people that are now served under the present licenses.
3. That the granting of these applications will result in a service to the public that is not now being offered.
4. That the granting of these applications will not work a violation of the Radio Act of 1927 as amended by the Act of March 28, 1928, and the Commission's regulations pursuant thereto.

95 5. That the applicant is financially and technically qualified to carry out the program as set forth in the above applications.

6. That public interest, convenience and necessity will be served by the granting of the applications.

Respectfully submitted,

WBBM BROADCASTING CORPORATION,
By JOHN M. LITTLEPAGE,
*Its Attorney.*

I.

District of Columbia,
*City of Washington, ss:*

Grace C. Ingels, after being duly sworn, on oath deposes and says that she is employed in the offices of Littlepage, Littlepage & Spearman, and that she has this day mailed, postage prepaid, a true and correct copy of the attached and foregoing "Notice of Desire to be Heard and Statement of Facts to be Proved at the Hearing", to the parties named in the notice mailed by the Commission to the above named applicant with respect to the hearing on the application referred to in the attached and foregoing document.

GRACE C. INGELS.

Subscribed and sworn to before me this the 24th day of August, A. D. 1932.

[Seal of Louise F. Dyer, Notary Public, District of Columbia.]

LOUISE F. DYER,
*Notary Public, D. C.*

96 [Stamp:] Federal Radio Commission. Received Aug. 26, 1932. James W. Baldwin, Secretary, by L. L. H.

Before the Federal Radio Commission, Washington, D. C.

Docket Nos. 1670 and 1671.

In re Application of KFAB Broadcasting Company, for Modification of License and Automatic Frequency Control. Operating Assignment Specified: Frequency, 770 Kc.; Power, 5 Kw.; Hours of operation, Simultaneous day operation with WBBM-WJBT, sharing night & synchronizing during certain specified night hours.

### *Appearance, Statement, and Affidavit.*

(Under Paragraph 48, Rules and Regulations, Federal Radio Commission.)

### I. Appearance.

Now, this 26th day of August, 1932, comes KFAB Broadcasting Company, by its counsel, files this, its written appearance in the above entitled matter and states that it desires to be heard in said matter on September 8, 1932, at the hour of ten o'clock, a. m., or on the date to which said hearing may be postponed pursuant to request, at the offices of the Commission at Washington, D. C.

KFAB BROADCASTING COMPANY,
By BETHUEL M. WEBSTER, Jr.,
PAUL M. SEGAL,
GEORGE S. SMITH,
*Its Attorneys.*

## 97 II. Statement in Writing of the Facts to be Proved at Said Hearing.

Applicant shows that at said hearing it expects to prove:

1. Applicant station has been so consistently operated in the public interest, convenience and necessity; its apparatus, technique, personnel, programs, financing, management and public relations have been so excellent that it is entitled to the improvement in assignment now requested.

2. No objectionable interference will be produced by the operation of the stations as proposed by applicant.

3. The granting of these applications will make possible the extension and enlargement of a unique service and will result in a better service to a greater number of people than are now served under the present license.

4. The granting of these applications will result in a service to the public that is not now being offered or not now available.

5. The granting of these applications will not be in violation of the Radio Act of 1927 as amended by the Act of March 28, 1928, and the Commission's Regulations pursuant thereto.

6. The applicant is technically and financially qualified to carry out the program as set forth in said applications.

7. Public interest, convenience and necessity will be served by the granting of said applications.

KFAB BROADCASTING COMPANY,
By BETHUEL M. WEBSTER, Jr.,
PAUL M. SEGAL,
GEORGE S. SMITH,
*Its Attorneys.*

## 98–102 III. Affidavit.

Washington,
*District of Columbia, ss:*

Edith Z. Miller, being upon her oath first duly sworn, says she is a clerk in the offices of Bethuel M. Webster, Jr., and Paul M. Segal, attorneys in this behalf for KFAB Broadcasting Company, at Washington, D. C., and on August 26, 1932, she mailed copies of this Appearance, Statement and Affidavit to the following:

John Littlepage, Esq., Attorney for WBBM, Union Trust Bldg., Washington, D. C.

St. Louis University (WEW), 221 N. Grand Blvd., St. Louis, Mo.

WJR, The Goodwill Station, Inc., Fisher Bldg., W. Grand & Second Blvd., Detroit, Mich.

Memphis Commercial Appeal, Inc. (WMC), 30 N. Second Street, Memphis, Tenn.

EDITH Z. MILLER.

Subscribed and sworn to before me, a Notary Public within and for the District of Columbia, this 26th day of August, 1932. My commission will expire January 20, 1933.

RICHARD A. MAHAR,
*Notary Public.*

* * * * * * *

103-105 7537.

Federal Radio Commission, Washington, D. C.

*Calendar of Hearings Scheduled for Monday, November 14, 1932, 10 A. M.*

| Docket No. | Call letters. | Name and address of applicant. | Nature of appli. | Freq. req. | Power req. |
|---|---|---|---|---|---|
| | | BROADCASTING | | | |
| 1668 | WBBM-WJBT | WBBM Broadcasting Corp., Chicago, Ill. | Auto. Freq. control. | 770 kc.<br>Simultaneous day sharing night KFAB. | 25 kw. |
| 1669 | " | Do........... | Mod. Lic. | 770 kc.<br>Synchronize with KFAB certain specified night hrs. (in addition to present lic.). | 25 kw. |
| | | Present Assignment: | | 770 kc.<br>Simultaneous day, sharing night, KFAB. | 5 kw. |
| 1670 | KFAB | KFAB Brdcstg. Co., Lincoln, Neb. | Mod. Lic. | 770 kc.<br>Synchronize with WBBM-WJBT certain specified night hrs. (in addition to present license). | 5 kw. |
| | | Present Assignment: | | 770 kc.<br>Simultaneous day, sharing night with WBBM-WJBT. | 5 kw. |
| 1671 | KFAB | KFAB Brdcstg. Co., Lincoln, Neb. | Auto. Freq. | 770 kc.<br>Simultaneous day, sharing night with WBBM-WJBT. | 5 kw. |

Other Parties Notified in Above Cases.

WEW, St. Louis, Mo.
WJR, Detroit, Mich.
WMC, Memphis, Tenn.

* * * * * * *

106 Federal Radio Commission, Washington, D. C.

Docket No. 1668.

In re Application of WBBM BROADCASTING CORPORATION, Chicago, Illinois. Call Letters: WBBM-WJBT. Application to Install Automatic Frequency Control. Frequency Requested 770 Kilocycles, 25 Kilowatts. Simultaneous Day Operation, Sharing at Night with KFAB.

Docket No. 1669.

In re Application of WBBM BROADCASTING CORPORATION, Chicago, Illinois. Call Letters: WBBM-WJBT. Application for Modification of License. Frequency Requested: 770 Kilocycles, 25 Kw. To Synchronize with KFAB Certain Specified Night Hours in Addition to Present License. Present Assignment: 770 Kilocycles, 25 Kw. Simultaneous Day, Sharing Night with KFAB.

No. 1670.

In re Application of KFAB BROADCASTING COMPANY, Lincoln, Nebraska. Call Letters: KFAB. Application for Modification of License. 770 Kilocycles, 5 Kilowatts. Scynchronize with WBBM-WJBT Certain Specified Night Hours in Addition to Present License. Present Assignment: 770 Kilocycles, 5 Kw. Simultaneous Day, Sharing Night with WBBM-WJBT.

107 Docket No. 1671.

In re Application of KFAB BROADCASTING COMPANY, Lincoln, Nebraska. Call Letters: KFAB. Application to Install Automatic Frequency Control. 770 Kilocycles, 5 Kilowatts. Simultaneous Day, Sharing Night with WBBM-WJBT.

Other parties notified in above cases:
WEW, St. Louis, Missouri.
WJR, Detroit, Michigan.
WMC, Memphis, Tennessee.

Hearing Room, Federal Radio Commission, Interior
Department Building, Washington, D. C.

Monday, November 14, 1932.

The above-entitled matters came on for hearing at 10 o'clock a. m. before Ellis A. Yost, Chief Examiner.

Appearances:

On behalf of the Commission: George B. Porter, Assistant General Counsel.

On behalf of WBBM-WJBT: Littlepage, Littlepage & Spearman, Attorneys at Law, Union Trust Building, Washington, D. C.

On behalf of KFAB: Littlepage, Little- & Spearman, Attorneys at Law, Union Trust Building, Washington, D. C.

108-747 *Proceedings.*

Chief Examiner Yost: There is designated for hearing at this time Docket No. 1668, WBBM-WJBT, WBBM Broadcasting Corporation, Chicago, Illinois, an application for automatic frequency control, operating on the 770 kilocycle channel with a power of 25 kw., simultaneous day operation, sharing time with KFAB. Is that applicant represented?

Mr. Spearman: Yes, sir.

Chief Examiner Yost: Also Docket No. 1669, the same company, for a modification of license, same frequency and same power.

Docket No. 1670, KFAB Broadcasting Company, Lincoln, Nebraska, operating on the same channel, with 5 kw., desiring to synchronize with WBBM-WJBT certain specified night hours in addition to the present license. Is that applicant represented?

Mr. Spearman: Yes, sir.

Mr. Thomas P. Littlepage: That applicant is represented by the same counsel.

Chief Examiner Yost: Docket No. 1671, KFAB Broadcasting Company, Lincoln, Nebraska, application for automatic frequency control, the same frequency and same power, simultaneous day, sharing night with WBBM-WJBT.

Are there any parties desiring to enter appearance as respondents in these cases?

(No response.)

There appear to be none.

These applications will be consolidated and heard as one case and covered by one report.

* * * * * * *

748 This report is not final but is subject to approval, modification or rejection by the Commission. The parties to the proceedings have fifteen days, with the exception of those from the Fifth Zone who have twenty days, in which to file objections or exceptions, if any, to the report.

8020.

Federal Radio Commission, Washington, D. C.

*Examiner's Report No. 453.*

Docket No. 1668.

In re Application of WBBM Broadcasting Corporation (WBBM), Chicago, Illinois, to Install Automatic Frequency Control.

Docket No. 1669.

In re Application of WBBM Broadcasting Corporation (WBBM), Chicago, Illinois, for Modification of License to Synchronize with Station KFAB Certain Specified Night Hours.

Present Assignment: Frequency, 770 kc.; Power, 25 kw.; Hours of operation, simultaneous day operation, sharing time at night with Station KFAB.

Docket No. 1670.

In re Application of KFAB Broadcasting Company (KFAB), Lincoln, Nebraska, for Modification of License to Synchronize with Station WBBM Certain Specified Night Hours.

## Docket No. 1671.

In re Application of KFAB Broadcasting Company (KFAB), Lincoln, Nebraska, to Install Automatic Frequency Control.

749 Present assignment: Frequency, 770 kc.; Power. 5 kw. (C. P. 25 kw.); Hours of operation, simultaneous day operation, sharing time at night with Station WBBM.

### Report of Ellis A. Yost, Chief Examiner.

Heard November 14 to 17, 1932.
Littlepage, Littlepage and Spearman for applicants.
George B. Porter for the Commission.

### Preliminary Statement.

Radio Station WBBM, Chicago, Illinois, and KFAB, Lincoln, Nebraska, are assigned to operate on the 770 kc. frequency, with 25 kilowatts and 5 kilowatts, respectively (KFAB having a construction permit for 25 kw). These stations operate simultaneously during the daytime and are licensed to operate at night on a time-sharing schedule. Station WBBM operates four-sevenths of the night hours and Station KFAB three-sevenths. The daytime operation of these stations is not involved and these applications relate only to the three-sevenths of the night hours assigned to Station KFAB. The night hours during which Station KFAB operates are approximately from 10 to 12 o'clock midnight.

Both WBBM Broadcasting Corporation and KFAB Broadcasting Company filed applications for authority to install automatic frequency control (Docket Nos. 1668 and 1671), and each of them filed an application for authority to operate Stations WBBM and KFAB simultaneously during the night hours now used by Station KFAB. The four applications were consolidated and heard as one case.

### Radio Station WBBM.

Radio Station WBBM-WJBT has been continuously operated since November 19, 1924. The WBBM Broadcasting Corporation, licensee of Station WBBM-WJBT, is shown by the evidence to have assets of $399,534.94 (Applicant's Exhibit A), and is technically capable and otherwise qualified to and has operated Station WBBM in an acceptable and commendable manner.

All of the capital stock of the WBBM Broadcasting Corporation, with the exception of one share, which is held by Mr. Leslie Atlass, as a qualifying share so as to make him eligible to be president of the applicant corporation, is owned by the Columbia Broadcasting System, Inc.

750 The Columbia Broadcasting System, and the National Broadcasting Company operate the two major network systems of the country. The Columbia Broadcasting System, Inc. operates one and the National Broadcasting Company two nation-wide networks, and each is a competitor of the other in this field. The National Broadcasting Company, through stock ownership and through agreements with the licensees of certain radio broadcasting stations in Chicago, Illinois, has available outlets for its two networks or chain program systems over the following radio stations located in Chicago, Illinois:

Station WENR,
" WLS,
" KYW,
" WMAQ,
" WCFL.

Stations WENR and WLS together constitute the equivalent of a full time station, and each operates with 50 KW. power; Station KYW operates full time with 10 KW. power; WMAQ operates full time with 5 KW. power, and Station WCFL operates with a power output of 1½ KW. and has been authorized to erect and operate a new transmitter with 5 KW. power full time. The National Broadcasting Company therefore enjoys the use of four full time high powered stations as outlets for its two networks, or two full time high powered stations for each of its networks.

The Columbia Broadcasting System, Inc., is solely dependent on Stations WBBM and WGN as Chicago outlets for its chain programs. Station WBBM is authorized by its license to operate only four-sevenths of the night hours. Under the arrangement between the Columbia Broadcasting System, Inc., and the licensee of Station WGN, the

Columbia Broadcasting System may Broadcast its programs over Station WGN during the hours of 6:30 p. m. to 8:30 p. m. and 9 p. m. to 9:30 p. m. daily. Because of the limitation on the hours during which Station WBBM may operate and the hours during which the Columbia Broadcasting System may operate its programs over Station WGN, it is impossible for the Columbia Broadcasting System to broadcast many of its programs to the listening audience in and about Chicago, Illinois. The Columbia Broadcasting System has no outlet whatever in Chicago through which it may demand the broadcasting of its programs between the hours of 10 p. m. and 12 p. m.

The programs broadcast by Station WBBM are generally meritorious. This station originates 25 hours or more of programs per week which it furnishes to and which are carried by the Columbia Broadcasting System and its affiliated stations. Station WBBM broadcasts many public service, charitable, civic, religious and patriotic programs free of charge. More than $500,000.00 per year is spent for talent used in the production of programs in the studios of Station WBBM. About one-fourth of this is spent for programs which originate in its studios and are carried by the Columbia network. Approximately $500,000.00 is spent in the operation of Station WBBM for purposes other than for talent.

The transmitting equipment and other associated apparatus employed and used at Station WBBM is of modern design and meets and complies with all the requirements of the Commission. Its studios are of modern design and are completely fitted out with the latest and most modern equipment.

751 Station WBBM is managed and controlled by executives of wide business experience, particularly in radio broadcasting. Its staff is made up of experienced employees. The employees constituting the program production and broadcasting staff of the station are capable men and women who have had many years experience in the production and broadcasting of radio programs.

A typical week's program of Station WBBM, in which each program is described and the kind and character of talent used is shown, was submitted as Applicant's Exhibits C and D. This evidence shows that the programs broadcast by this station are produced by talent of excellent quality.

An exhibit was introduced in evidence showing the programs originated and offered by the Columbia Broadcasting System for the week of October 16th to October 22nd, 1932, inclusive, and this exhibit was checked to show the programs which Station WBBM could and would broadcast between the hours of 10 p. m. and 12 o'clock midnight, but for the fact that Station WBBM is silent during these hours. An examination of this exhibit shows that splendid programs are available during these hours (Applicant's Exhibit E).

## Radio Station KFAB.

Radio Station KFAB has been continuously operated at Lincoln, Nebraska, since November 8, 1924. The KFAB Broadcasting Company is shown to be in good financial condition (Applicant's Exhibit F). This company is technically and otherwise qualified and capable of and has operated Station KFAB in an acceptable manner and has been broadcasting programs which are generally meritorious. About $50,000.00 per year is spent for talent used in the production of programs of local origin which are broadcast over the station. An additional sum of approximately $50,000.00 per year is spent in the operation of the station for purposes other than for talent.

The transmitting equipment and other apparatus used in the operation of Station KFAB is of modern design and complies with all requirements of the Commission. The studios of this station are equipped with the latest and most modern apparatus.

Station KFAB is managed and controlled by executives who have had broad experience in business and particularly in radio broadcasting. Its operating staff is made up of experienced employees who are capable of operating the station in an acceptable manner. The program and program production staff of the station is likewise comprised of capable men and women experienced in the production and broadcasting of radio programs (Applicant's Exhibit G).

The applicant introduced in evidence its Exhibit H, which is a typical week's program of Station KFAB. This exhibit shows the character of each of said programs, as well as information with respect to the talent used in producing them. The programs broadcast by this station are generally meritorious.

To determine the existing conditions in the territory intervening between Stations WBBM-WJBT and KFAB, Mr. Frank Falknor, an experienced radio engineer, was sent into this area to make measurements and investigate the present conditions so far as reception from Stations WBBM-WJBT and KFAB were concerned. 752

Using standard field intensity measuring equipment, Mr. Falknor measured the field intensities of both stations (Applicant's Exhibits 1 to 7, inclusive). Nighttime measurements were made by him near Des Moines, Iowa. These measurements show that severe fading was encountered when listening to either WBBM or KFAB. The field intensity or signal strength of Station WBBM varied over a ratio of 13 to 1, while the field intensity of KFAB faded and fluctuated over a ratio of 12 to 1. This fading on both stations was continuous through all observations made (R. 25, 26; Applicant's Exhibit 8). The service rendered at this point by either of the stations was very poor due to this high ratio of fading, and this fading was made worse by very bad side band fading. The side band fading caused the quality of the reception to be impaired to an exaggerated extent. This was common experience in this territory (R. 28).

At the point where these observations were made it would have been necessary to make five adjustments of the volume control of a radio receiver during the short period of 27 minutes in order to secure good reception from WBBM, and 8 such adjustments would have been necessary to have secured good reception from KFAB in the short period of 28 minutes. These adjustments would have been necessary on all receivers having manual controls (R. 29). Only ten to twenty percent of the receivers now in use are equipped with automatic volume control (R. 30). The majority of the sets which employ automatic volume control are power-operated and therefore cannot be used on farms (R. 31). It is common knowledge that the territory intervening between Stations KFAB and WBBM is an agricultural region.

Night time measurements were made by Mr. Falknor at Galesburg, Illinois. At this place the signal from WBBM was measured and observed to fade over a ratio of 350 to 1 which would give severe fading or changes in loud speaker volume, and no such signal could be said to give satisfactory reception (R. 32, 33). The fading from WBBM at this point was about as bad as it is possible for fading to be (R. 34, 36). The signal from Station KFAB was very poor at this same place due to the fading of the carrier wave, and especially due to side band fading (R. 34, 35; Applicant's Exhibit 9).

The fading curves introduced in evidence to show the fluctuation in signal intensity of Stations WBBM and KFAB, bad as they show this evidence to be, do not show the true order of deviation of the signals, since these curves do not indicate the degree of side band fading. If it were possible to prepare curves showing the side band fading as well as the fading of the carrier wave, such curves would indicate much poorer service than that indicated by applicant's exhibits (R. 35).

Mr. Falknor made tests in this same general territory in October, 1931. At that time he made and observed the performance of Stations WENR, WMAQ, WGN and WBBM, all of Chicago, and he found the same general conditions existing on all of them as are shown to exist at this time with respect to Stations WBBM and KFAB (R. 37).

Mr. Falknor also made measurements of Stations WBBM and KFAB at Shenandoah, Iowa. During the period of 18½ minutes the signal of Station WBBM varied, in intensity, over a ratio of 4 to 1, and would have required two or three adjustments of the volume control of a radio receiver to receive or enjoy the program from that station at this place (R. 39, 40).

753 Observations were also made of Station WENR at Shenandoah and Des Moines, Iowa by the witness Falknor. These observations show severe fading of the signal from this station (Applicant's Exhibits 11 and 12; R. 41, 42).

A radio signal varying in strength, such as that shown to exist at Galesburg, Illinois, could not be handled by a receiver equipped with automatic volume control, and even if a set were capable of handling such a signal, reception would probably be ruined, since local interference and background noise would necessarily be increased in the loud speaker as the radio signal decreased in strength (R. 40).

The signals or field intensities of Stations WBBM and KFAB were measured within the area between the two stations. Within this area and at points where the desired to the undesired signal is less than 2 to 1, neither station can render high grade service. Since the maximum daylight signal would be .2 millivolt per meter or lower, a low grade of rural service might be rendered, but this would be subject to ruin by man-made interference or inclement weather. Because of the severe fading encountered at night, this poor or low grade of service would be severely depreciated (R. 43 to 45).

Within the territory intervening between Stations WBBM and KFAB and where neither can nor does render good service, Station WHO is situated. This station has been authorized to construct and operate a 50 KW. station. The service which Station WHO would render in this territory would be of a high order and would compare favorably to the service now rendered by KFAB in the vicinity of Lincoln, Nebraska, and the service of WBBM in the vicinity of Chicago, Illinois. Station KMOX, St. Louis, Missouri, operating with 50 KW., will serve a portion of this intervening territory with as high grade service as could be expected from either WBBM or KFAB.

Station WCCO, operating with 50 KW. at Minneapolis, Minnesota, will serve another portion of this intervening territory with as good service as either WBBM or KFAB would be expected to render. Still another station, WMT, Waterloo, Iowa, serves a large portion of this territory. Stations KMOX, WCCO and WMT all carry Columbia programs. Columbia programs are also carried by Stations WBBM and KFAB. Listeners within this territory would therefore be able to receive Columbia programs from KMOX, WCCO and WMT if any interference should exist or be caused by the simultaneous synchronized operation of Stations WBBM and KFAB (R. 45).

The measurements of Station WBBM at Shenandoah, Iowa, and other points represents a fair value of the signal which would ordinarily be expected from a clear channel station at these distances. All clear channel stations are affected by bad fading in certain areas, and the conditions observed with respect to Station WBBM appears to be representative of the average. The same general conditions as hereinbefore stated have been observed in this same territory by the same witness, during October 1931 (R. 58).

The daytime measurements made by Mr. Falknor and submitted in evidence define the daytime service areas of Stations KFAB and WBBM. These measurements and observations were made for the purpose of drawing certain conclusions, and were used in connection with skywave measurements as one of the means by which the synchronized operation of the two stations might be predicted.

754 Night time signal intensities can be fairly and accurately predicted from daytime measurements and accepted principles of radio engineering (R. 61, 62). The daytime measurements of Stations KFAB and WBBM, when compared to the curves published in the 5th Annual Report of the Federal Radio Commission, prepared by Mr. John H. Barron, Commission engineer, showing both ground and sky wave, can be used to calculate the average value of the various waves received at a given point, thereby anticipating the fading effects which will be encountered.

In October 1931 Mr. Falknor made observations in the territory intervening between Stations WHO and WOC while operating synchronously. He also observed the conditions and effects of the synchronized operation of Stations WBZ and WBZA in 1925. Stations WHO and WOC were located approximately 150 miles apart. When these stations were operated synchronously there was an overlapping of their ground waves. Due to the high attenuation between Stations WBZ and WBZA there was no overlapping of the ground waves radiated by these stations, despite their locations. The distance from Station WBBM to Station KFAB is approximately 475 miles (R. 50). The territory intervening between these stations must depend to a very large extent upon the ground waves for reception from these stations.

Mr. Roy E. Coram, a radio engineer who is and has been for many years employed by the Bell Telephone Laboratories, agrees with the statement of the witness Falknor, that Station WHO operating with 50 kilowatts should render high grade service.

The apparatus or equipment which the applicants propose to install and use to carry out this experiment in synchronization is a development of the Bell Telephone Laboratories. This apparatus was designed by Mr. Roy

E. Coram and his associates in the Bell Laboratories. The Bell Laboratories began the intense investigation and development of common frequency broadcast work in 1930. This work has been carried on both in the field and in the laboratory, the field work being done in cooperation with the Columbia Broadcasting System. The first installation of the orignial apparatus developed was at Stations WHO and WOC. The apparatus used by these stations was manually controlled. That which the applicants propose to install will be automatic.

In addition to the experiments conducted at Stations WHO and WOC, the Bell Telephone Laboratories conducted common frequency broadcast control experiments while operating Stations WABC, New York City, WHK, Cleveland, Ohio, and WKBW, Buffalo, New York, simultaneously on a common frequency. The tests conducted while operating these three stations synchronously were made with a more perfected synchronizing system. The results of surveys made in the field while these tests were under way show that the normal service areas of the stations were in no way decreased, nor were their normal service areas decreased when any two of them were operated synchronously (R. 136, 137).

Mr. Barron testified that he observed the synchronous operation of Stations WABC, WHK and WKBW at a point alsot equi-distant from the three of them. He could not observe any difference when the stations were operating one, two or three at a time. Fading was as bad when only one station was operating as when two or three were operating synchronously. These observations were made by him in January or February 1931. He testified that propagation conditions appeared to be very good on that night. The point at which he made the observations was about 200 miles from each of the three stations (R.
755 256, 257). The location at which Mr. Barron made these observations was in approximately the same area with respect to these three stations as the territory midway between Stations WBBM and KFAB would be (R. 258). Mr. Barron admitted that the conditions he observed were similar to the conditions which might be expected if Stations WBBM and KFAB were operated synchronously, since the night time service areas of WBBM and KFAB do not overlap (R. 259).

The apparatus which the applicants propose to install and use to synchronize Stations WBBM and KFAB was described by Mr. Coram. It consists of separate crystal oscillators for each station which are automatically and constantly compared to a 4000-cycle standard frequency supplied to the two stations from a common source. The result of this constant comparison is that the slightest deviation of either station from the standard of comparison causes an automatic compensation to be made to correct the deviation. As before stated, this apparatus is entirely automatic and no human element or manual control is involved. The proposed equipment will correct an error of one-thousandth cycle out of one million cycles per second. A conservative statement of the accuracy with which the equipment may be expected to operate is that the maximum deviation will never exceed one-tenth of one cycle (R. 139 to 145).

The crystal oscillators to be used at both stations are designed to maintain the stations' frequencies to within plus or minus 50 cycles of their assigned frequency without benefit of the standard frequency (4000 cycles) or automatic comparison and compensation (R. 147). The standard frequency source (the 4000-cycle reference frequency) might fail for a period of fifteen minutes, and yet the deviation of the two stations from their assigned frequencies would not be greater than one-tenth cycle (R. 151). Even if the standard frequency together with its automatic comparison and compensation is available but ten seconds in every fifteen minutes, the two stations will remain within one-tenth cycle of their common assigned frequency (R. 151).

The witness Glenn D. Gillett, who is an expert radio engineer and was employed by the Bell Telephone Laboratories for several years and who has carried on extensive laboratory and field experiments in common frequency broadcasting, testified that under perfect conditions, such as exist in a laboratory, the ratio of the desired to the undesired signal must be 4 to 1 if the stations are operating synchronously and no deterioration in the quality of the desired signal is to be detected. He testified, however, that in practice and under practical operating conditions the signal received from one station constitutes the standard of comparison, and this standard cannot be as perfect as if an experiment were being performed in a laboratory. Under actual and practical operating conditions very slight impairment of the quality of the desired signal will be noticed if a ratio of 2 to 1 is maintained between the desired and undesired signals (R. 70).

From the investigations made by the witness Falknor and the actual field intensity measurements made by him, it appears that in the territory between Stations WBBM and KFAB there is a certain territory within which neither of the signals of the stations involved (WBBM and KFAB) will be twice as strong as the signal from the other. Under these conditions objectionable interference would result but for the fact that both stations fade so severely and with such rapidity that neither of them renders acceptable service at such time.

756 Prior to the beginning of the experiments conducted while operating Stations WTIC and WEAF simultaneously on a common frequency, or in synchronism, the witness Gillett computed the results which would follow from these experiments (Applicant's Exhibit 13). After the experiments were begun he made personal investigations of the area lying between WTIC and WEAF during both day and night and noted the impairment which resulted from the simultaneous synchronous operation of these stations and defined the boundaries of the area within which this interference existed. The calculations and predictions made by the witness Gillett prior to the beginning of these experiments coincide almost entirely with the actual results during the synchronous operation of these stations (R. 70). It follows therefore that based on known engineering principles and data accumulated from actual experiments, that a qualified radio engineer can appproximate the results to be expected from the synchronous operation of two broadcasting stations within very narrow limits.

The same witness Gillett likewise calculated the results expected from the synchronous operation of Stations WHO and WOC. These calculations coincide quite closely with the results actually obtained when the two stations were operated simultaneously and on a common frequency (R. 74).

In the experiments conducted through the synchronous operation of Stations WTIC and WEAF and in the experiment conducted while operating Stations WHO and WOC simultaneously on a common frequency, it was necessary to take into account both the ground and sky waves radiated by these stations because of the separation or lack of separation between the stations being operated in synchronism (R. 76). In each instance the ground waves of the stations overlapped. This is not true as between Stations WBBM and KFAB. These stations are separated by approximately 475 miles and neither of them lay down an appreciable ground wave for half this distance.

As has been stated hereinbefore, fading of both stations WBBM and KFAB is very severe and the service rendered by either of them is unreliable in the territory intervening between them and outside of their primary service areas. This fading is usually caused by the simultaneous arrival of two or more waves at the point of reception while out of phase. They are transmitted and/or received out of phase due to different angles of radiation from the transmitting antenna and the peculiar shape of and reflection by the Heaviside layer. When a multiplicity of waves are received, as is true in the reception of sky waves between WBBM and KFAB, those waves which arrive 180 degrees out of phase tend to cancel each other and cause fading. If such waves arrive in phase or approximately so, they tend to add and increase the received signal over the actual signal strength of any single wave received at the point of reception. The law of probabilities is that there is a greater likelihood of the waves arriving in or approximately in phase and in increasing the strength of the signal at the point of reception.

The applicant introduced in evidence its Exhibit 14 which is a mechanical device to demonstrate what takes place when the height of the Heaviside layer causes the ground and sky waves to change from a condition of opposition to one of addition. It demonstrates that under only one condition will complete cancellation of the signal occur. This is when the two waves are of equal strength and 180 degrees out of phase. This same exhibit was used to demonstrate the adding and substracting effects of a ground and a sky wave so as to produce fading (R. 79, 80). It 757 appears that if a multiplicity of waves arrive at a given point simultaneously, the strength of the received signal equals the difference between the sum of all the waves arriving in phase, or approximately so, and the sum of all those arriving in such a way as to cause cancellation (R. 78). At distances where the ground wave is weak, as is true in the territory between KFAB and WBBM, one or more sky waves provided the received signal. The relations of such sky waves vary at random. The result is that such waves are always adding and some signal is always received (R. 82). It follows therefore that where two stations are radiating sky waves and these sky waves are received at a single point from both stations, the probability is that the received signal from such sky wave transmission will be greater at such point than it would be if the receiver depended on the sky waves radiated by and received from a single transmitter.

Applicant's Exhibit 16 is a map showing the 10 Mv/M, 2 Mv/M, 1 Mv/M and .5 Mv/M service areas of both Stations WBBM and KFAB. These contours are based on actual measurements of the signal strength of the stations in question by the witness Falknor (R. 85, 86).

Applicant's Exhibit 17 is a graph showing the ground wave versus distance, the maximum signal versus distance, and the minimum signal versus distance, for Station KFAB. These are also based on the actual field strength measurements made in the field by Mr. Falknor on a line connecting Stations WBBM and KFAB (R. 88). On this exhibit are located the points between the stations where the signal from each of them will be affected by the signal from the other. These points were located after determining that the signal from one of the stations would be at least twice as great as the signal received at that point from the other. On this same exhibit were located the boundaries of the reliable daytime service areas of the two stations after determining the maximum night signal expected from the undesired station. This latter boundary marks the limit where the occasional impairment of the desired station's reception may be expected on average nights. Such impairment, however, will occur only when the undesired signal reaches its maximum in strength. The first limitation or contour mentioned marks the limit of the service area which each station is expected to serve under the worst conditions (R. 92, 93).

Applicant's Exhibit 18 shows the service areas which each of the stations (WBBM and KFAB) will serve when the undesired station is at its worst and represents the service area of each station which will in no wise be affected by the synchronous operation of the stations in question (R. 94, 95). This all-time high quality service area is designated by a heavy contour line. A broken line on the same exhibit indicates the limit at which severe quality impairment would be experienced occasionally under average night conditions (R. 96). If average signals are transmitted by both stations good quality service will be rendered within the whole of the area bounded by the broken contour lines on applicant's exhibit 18 (R. 96). Long experience and extended observations in the area between Stations KFAB and WBBM show that average conditions prevail in this territory (R. 96). Within the area outside of that bounded by the heavy contour line on applicant's exhibit 18 and within the area bounded by the broken contour line on the same exhibit, the signals from Stations WBBM and KFAB are now seriously impaired and the simultaneous synchronous operation of both stations while carrying common programs, as is contemplated by the applicants, will, on the average, improve the quality of reception of both stations (R. 100). This is an expert opinion and is based on and borne out by the graph which
758 appears on page 15 of applicant's Exhibit 19, which
exhibit is a treatise on the development of common frequency broadcasting which was prepared by and under direction of the witness Gillett. This graph is based on actual observations and an analysis of what may be expected to occur based on accepted engineering principles (R. 100). Due to the variable nature of the Heaviside layer and taking into account what is probable, it appears that as the number of stations is increased (operating in synchronism carrying a common program) the probability is that the radiation of a multiplicity of waves to a given or common point is advantageous. This is so because when two or more stations operate on a common frequency and carry a common program they tend to maintain a more constant level of signal strength. This also applies to sideband fading (R. 102).

The witness Gillett testified that the standards applied by him in his calculations as to what would result from the synchronous operation of Stations WBBM and KFAB were higher than the standards of listeners and because the standards used by him are higher than the standards of listeners, it is improbable that WBBM and KFAB, if operated synchronously, would render any worse service than if one of the stations operated alone (R. 103, 104).

The witness Barron testified that he made an investigation and observed the operation while Station WEAF was synchronized with Station WTIC, and of the synchronous operation of WJZ and WBAL (R. 219, 220). His observations were made while using a battery-operated receiver and covered the operation of both single and synchronized operation. He did not notice any improvement or impairment in the service rendered by either of the stations where sky wave alone was involved (R. 222). He did testify, however, that the overlapping good service areas of WTIC and WEAF were impaired by their synchronous operation and that similar conditions existed in the good service areas of Stations WJZ and WBAL while being operated simultaneously on a common frequency (R. 222, 223). It is to be observed, however, that there is no overlapping of the good service areas of Stations WBBM and KFAB.

Mr. Barron made measurements in the New Haven area which indicated bad distortion where the ratio of desired to undesired signal was 1 to 1. This ratio, however, is not involved in the instant applications. He also observed that where the two stations operated so that the desired signal was only twice as great as that of the undesired, objectionable distortion was present, and stated that where the ratio of the desired to the undesired was 4 to 1, satisfactory service was rendered. Mr. Barron admitted, however, that where he observed the ratio of the desired to the undesired signal to be 2 to 1, that these observations were made at a point where the desired signal was as near a perfect signal as could be obtained, so that his comparison was one of perfection and imperfection. He admitted that the distortion was much more noticeable than if the comparison had been made with an already distorted signal as his standard (R. 224). The witness Barron testified that he had listened to the synchronous operation of Stations WTIC and WEAF and to the synchronous operation of Stations WBAL and WJZ. Reception in Washington of WTIC and WEAF was about the same whether synchronized or not. The only time he noticed any distortion attributable to synchronous operation on Stations WJZ and WBAL was during a part of the winter (R. 224, 225).

The necessity for a ratio between desired and undesired signals of 4 to 1 as testified by the witness Barron was based on his observations of the synchronous operation, in which he was comparing a perfect with an imperfect
759 signal and where the good service area of the stations being operated simultaneously overlapped.

Mr. Barron testified that if Stations WBBM and KFAB were operated simultaneously on a common frequency as proposed by the applicants, the 10 Mv/M contour of neither station would be affected. He defined the area which receives a signal of 10 Mv/M or greater in signal strength as the high grade service area of a broadcasting station, and the 2 Mv/M contour boundary as the limit of secondary service. He also stated that .5 Mv/M was the limit of high grade rural service, and that service rendered by stations outside the area within which its signal was this strong was of an intermittent character (R. 221). Mr. Barron, however, stated that a 2 Mv/M signal may fade to such an extent that it will be wholly unsatisfactory but claimed that with the powers generally used today, such a signal was satisfactory (R. 233, 234).

The witness Barron testified that signals of this order fading as they do at Galesburg, Illinois, indicated unsatisfactory service, and that the reception of such a signal, if at all satisfactory, would require considerable manipulation of the volume control of the receiver (R. 234 to 236). Mr. Barron stated that this fading ratio of 12 or 13 to 1 was unnoticeable to the ear (R. 236, 237) and applicant's Exhibits 8, 9 and 10 show relatively rapid fading of the signals of both Stations WBBM and KFAB (R. 238).

Mr. Barron testified that Station WHO operating with 50 Kw. power would render much better service around Des Moines than will either KFAB or WBBM (R. 237), and that in the absence of knowledge to the contrary Station KMOX, St. Louis, Missouri and Station WCCO, Minneapolis, Minnesota, will serve the intervening territory which may be impaired in quality by the simultaneous synchronous operation of Stations WBBM and KFAB with service of the same grade and quality as would be rendered to this area by either Station WBBM or KFAB if operating alone (R. 237 to 240).

The witness Barron testified that curves appearing on page 39 of the Fifth Annual Report of the Federal Radio Commission show that fading will begin at a distance of approximately 20 miles from the average transmitter. He stated, however, that at this point such fading would not be objectionable, but that the objectionable fading increases in intensity until the ground and sky waves become equal, and that the most objectionable fading would result at points where the ratio of sky wave to ground wave, or vice versa, is less than 4 to 2 (R. 241, 242). This curve shows average conditions and is based on actual measurements and not on theory (R. 244). He stated that at distances of 40 miles from transmitters there would be considerable fading and that this fading would continue out to where sky waves alone are received. From this point on, he said, fading is due to interference between two sky waves being received out of phase, or because of changing conditions of the Heaviside layer. To reflected waves from the Heaviside layer is a common occurrence and a multiplicity of sky waves is found at points where the ground wave is weak (R. 245 to 249).

Mr. Barron stated that the result of receiving a multiplicity of sky waves could be determined by ascertaining the difference between the sum of the waves in phases and the sum of the waves out of phase (R. 252). The testimony of the witness Gillett is in agreement with this statement (R. 78).

760 Certain of the calculations made by the witness Gillett and based on the law of probabilities (applicant's Exhibits 18 and 19) were to the effect that there was much more probability of an increased signal where a multiplicity of sky waves were received (R. 375, 376). Mr. Barron stated that as a result of his observations of the synchronous operation of Stations WHK, WABC and WKBW, he was of the expert opinion that it was much better to synchronize stations separated by 475 miles than to synchronize stations separated by less than this distance and where their primary service areas would overlap, as is true with respect to the synchronous operation of Stations WTIC and WEAF, and of WBAL and WJZ (R. 361, 362). He stated that because of the separation between WBBM and KFAB, the synchronous operation of these stations will not affect either the primary or secondary service areas

of either for the greater portion of the time (R. 362). This would hold true even if Station KFAB should later operate with 25 kw. power instead of 5 kw., as at present (R. 364, 365), because a ratio of desired to undesired signal as low as 4 to 1 will not exist over a great portion of the time (R. 368, 369).

The witness Barron testified that where imperfect signals are compared, the ratio of 2 to 1 for the desired to the undesired signal is probably correct (R. 370). Naturally a comparison of imperfect with imperfect signal will be necessary as between Stations WBBM and KFAB because of the great distance over which these signals would travel before reaching the ratio stated.

Considering the law of probabilities and the mathematical formulae involved, Mr. Barron stated that the average reception and the average program will be better if the two stations in question are operated synchronously than if reception is attempted while only one of the stations is broadcasting, but stated that at times the quality might be somewhat worse (R. 375). After considering the question Mr. Barron stated that the law of probabilities used by Mr. Gillett in his calculations were mathematically correct (R. 380).

Radio waves are nothing more or less than what are commonly referred to in electrical engineering as "sign waves".

Prof. Thomas J. MacCavanaugh, Vice Dean of the School of Engineering and professor of radio engineering at Catholic University of America, testified that the effective value of a complex voltage, composed of two sign waves of different frequencies, would be equal to the square root of the sum of the squares of the two voltages being combined. This formula is mathematically exact and correct and has been accepted by the leading electrical engineers, among them the late Charles P. Steinmetz, who referred to this formula and used it in his electrical engineering work. This formula was contained in an electrical engineering textbook by Dr. Steinmetz which was published in 1897 and is accepted by the electrical engineering profession. From this formula it is found that if two sign waves (or two radio waves) of equal intensity are received simultaneously the result will be equal to 1.414 times the intensity of either wave (R. 318). Based on this accepted and accurate mathematical formula, two stations located as Stations WBBM and KFAB are, should produce a resultant field strength, due to sky waves alone, stronger than either one alone. In short, these fields will reinforce each other (R. 320).

Prof. MacCavanaugh made listening tests of the synchronous operation of WJZ and WBAL and compared the field strength received while these stations were operating synchronously with the field strength received while one of them was being operated alone, and found that when the stations were operating synchronously the signal
761 did not fade out altogether but really produced an improvement in the service rendered. These actual tests substantiate the accuracy and dependability of the mathematical formula referred to (R. 321).

The witness MacCavanaugh also testified that the synchronous operation of Stations WBBM and KFAB should result on the average in an increase in the field strength at points between these stations. He also testified that the more waves being received, the better the chance of building up a signal to a constant level (R. 327). The net result would be that during approximately one-third or less of the time the signal would be less in magnitude than if one of the stations should operate alone, but that during two-thirds or more of the time the resultant signal would be increased in magnitude. With the two stations operating synchronously the result expected would be an improvement of service within the territory intervening between Stations WBBM and KFAB for at least two-thirds or more of the time (R. 329).

Prof. MacCavanaugh agreed with the statement of the witnesses Falknor, Gillett and Barron that because of the severe fading of both Stations WBBM and KFAB, neither of them, if operated alone, would give good or even fair service within the territory intervening between these stations.

The applicants propose to install time-delay equipment which will permit of the simultaneous broadcasting of the same program from both Stations WBBM and KFAB, regardless of the origin of such program. Such equipment has been developed and is being commercially used. Stations WBBM and KFAB will be directly connected with each other by telephone lines used to carry such programs. Should the time-delay equipment not prove entirely satisfactory, the applicants proposed to use an additional telephone line which will feed the common program to be broadcast by these stations into the trunk line connecting the two at a point midway between the stations. In this way the program to be broadcast by these stations will arrive and be broadcast by them simultaneously. This will tend to prevent simultaneous reception of programs from both of them without the undesirable effects which are usually present when a common program might otherwise be broadcast by these two stations and be received so that one program arrives slightly in advance of the other. This produces an objectionable echo effect. This echo effect will be almost, if not entirely, eliminated through the use of the time-delay system and apparatus which the applicants propose to install, or in the event that this system does not prove as efficient as it is believed it will prove, this will be offset and taken care of by the use of the feeder line intersecting the trunk line connecting the two stations at a point midway between them.

A much larger number of listeners will be reached and may receive service from Stations WBBM and KFAB when the two are operating synchronously than is possible when only one of the stations is being operated.

The applicants propose to conduct these synchronization tests between the hours of 10 p. m. and midnight. It is common knowledge that during this period of time listeners in rural communities are less numerous than at any other period during the broadcast day. On the other hand, the metropolitan audiences are known to listen regularly to radio programs during these hours. In view of this, it is believed that if any interference whatever is caused by the synchronous operation of these stations, that such interference will occur during such periods of time as to affect the smallest number of listeners.

762 Since Stations WBBM and KFAB will operate synchronously for only approximately two hours during nighttime, and since only one of the stations will be in operation during the remaining night hours, it will be possible for the applicants or any and all other interested parties to observe the operation of these stations while synchronized and to likewise observe the operation of these stations when only one of them is broadcasting. In this way it will be possible to definitely determine what the results of the synchronization tests are and make a detailed and complete comparison between the effects produced

when only one station is being operated and when the two are being operated synchronously.

The applicants herein, if these applications are granted, will have the complete cooperation of the Bell Telephone Laboratories, Inc., one of the outstanding radio engineering organizations of the country. This cooperation will provide the resources of the Bell Laboratories, including equipment and trained development and research engineers who are interested in advancing the art of common frequency broadcasting.

## Conclusions.

1. The applicants, licensees of Stations WBBM and KFAB, are financially, technically and otherwise qualified to operate Stations WBBM and KFAB in accordance with the applications and to carry on and conduct the experiments and tests which they propose.

2. The programs which Stations WBBM and KFAB would broadcast while synchronized would be of a high order and would provide Columbia programs for a large number of listeners who do not now receive these programs in a satisfactory manner from any other broadcasting station.

3. The Chicago area is the second most important in the country to the Columbia Broadcasting System, and these synchronization experiments would provide an outlet for its programs during the hours between 10 p. m. and midnight, thus providing continuous Columbia service to millions of people in the Chicago area who do not now receive such a service.

4. The synchronization experiments proposed by the applicants are materially different from any synchronization experiments heretofore undertaken under practical operating conditions. It is the first complete synchronization experiment proposed to the Commission in which the stations to be synchronized are so separated that the good service area of the stations in question do not overlap.

5. Should any interference result in that territory intervening between Stations WBBM and KFAB, it is reasonable to conclude that other existing stations which broadcast the programs of the Columbia Broadcasting System would render as good and acceptable service therein as is possible for either WBBM or KFAB to do while only one

of them is being operated. Moreover, the benefit to the great number of people who would receive additional and improved radio reception from the proposed operation would far outweigh any possible adverse effect caused to listeners by such operation.

6. From synchronization tests heretofore made both in the laboratory and in the field and from known radio engineering knowledge, the results of the proposed
763 synchronization experiments may be closely approximated. The evidence adduced at the hearing shows that in all probability the service rendered by either Station WBBM or KFAB is less satisfactory than may be expected during at least two-thirds of the time if these stations are permitted to operate synchronously.

7. The synchronous experiments proposed by the applicants would be conducted by the executives and engineers of the applicants of the Columbia Broadcasting System and of the Bell Telephone Laboratories, Inc. The training and experience, as well as the financial resources which will be available for making these experiments, would insure them to be conducted in the highest possible manner and to add considerable to existing knowledge on the subject of common frequency broadcasting. It appears that these tests would be conducted in such a way as to prove the practicability or impracticability of common frequency broadcasting under practical operating conditions. This proof is of importance in the advancing science of radio broadcasting.

8. Based on prior experiments and accepted engineering knowledge, it is believed that the proposed system of synchronization, together with the capable manner in which it will be operated, has more than an equal chance of proving successful. Should the experiments prove to be a success they would account for one of the most important and advanced steps in radio engineering which has taken place in recent years.

9. The making and conducting of the synchronization experiments proposed by the applicants, because of the data and facts which would be gathered therefrom, are of such importance to the art of radio broadcasting that public interest, convenience and necessity would be served by the granting of these applications and the making of the tests and conducting of the experiments proposed.

## Recommendations.

In consideration of the foregoing it is recommended:

1. That the applications of WBBM Broadcasting Corporation and KFAB Broadcasting Company for authority to install automatic frequency control at Stations WBBM and KFAB, respectively, be *granted.*

2. That the applications of WBBM Broadcasting Corporation and KFAB Broadcasting Company for modification of their existing station licenses so as to authorize the experimental synchronous operation of Stations WBBM and KFAB as requested in said applications, be granted.

ELLIS A. YOST,
*Chief Examiner.*

Submitted February 11, 1933.
Released Feb. 15, 1933. Exceptions due Mar. 6, 1933.

764 Kirkland, Fleming, Green & Martin, 33 North La Salle Street, Chicago.

Robert R. McCormick, Retired 1920; Weymouth Kirkland, Joseph B. Fleming, Dwight P. Green, Mellen C. Martin, Howard Ellis, Louis G. Caldwell, Charles F. Rathbun, I. B. Kirkland, Robert N. Golding, William H. Symmes, Walter C. Senne, W. Ayers Keplinger, William Wilson, Carl S. Lloyd, Adrian L. Hoover, Vernon M. Welsh, Willis D. Nance, Jay Fred Reeve, David Jacker.

Washington Office: National Press Building.

February 18, 1933.

Mr. James W. Baldwin,
Secretary, Federal Radio Commission,
Washington, D. C.

Dear Mr. Baldwin:

Will you please send me a copy of Examiner's Report No. 453 in re the applications of WBBM Broadcasting Corporation and KFAB Broadcasting Company.

Thanking you in advance, I remain,
Yours very truly,
KIRKLAND, FLEMING, GREEN & MARTIN,
By KEITH MASTUS.

KM:VA.

Copy mailed 2/20/33.

[Stamp:] Received Docket Section, Feb. 20, 1933.

[Stamp:] Federal Radio Comm. Received 1st Mail. Mail and Files. Feb. 20, 1933.

765 8227.

Federal Radio Commission, Washington, D. C.

Docket Nos. 1668, 1669.

In re Applications of WBBM BROADCASTING CORPORATION (WBBM), Chicago, Illinois, for Authority to Install Automatic Frequency Control and for Modification of License (to Synchronize with Station KFAB Certain Specified Night Hours),

and Docket Nos. 1670, 1671.

In re Applications of KFAB BROADCASTING COMPANY (KFAB), Lincoln, Nebraska, for Modification of License (to Synchronize with Station WBBM Certain Specified Night Hours) and Authority to Install Automatic Frequency Control.

## *Statement of Facts, Grounds for Decision, and Order of the Commission.*

### Preliminary Statement and the Issues.

This proceeding involves applications filed by Radio Station WBBM, Chicago, Illinois, and Station KFAB, Lincoln, Nebraska, now assigned to operate on the 770 kc. frequency, with 25 kilowatts and 5 kilowatts, respectively, (KFAB having a construction permit for 25 KW). These stations operate simultaneously during the daytime and are licensed to operate at night on a time-sharing schedule. Station WBBM operates four-sevenths of the night hours and Station KFAB three-sevenths. The daytime operation of these stations is not involved and these applications relate only to the three-sevenths of the night hours assigned to Station KFAB. The night hours during which Station KFAB operates are approximately from 10 p. m. to 12 midnight.

Both WBBM Broadcasting Corporation and KFAB Broadcasting Company filed applications for authority to install automatic frequency control (Docket Nos. 1668 and 1671), and each of them filed an application for authority to operate Stations WBBM and KFAB simultaneously during the night hours now used by Station KFAB.

766 These applications were consolidated for hearing and heard before Chief Examiner Yost November 14 to 17, 1932. There were no respondents in the case. The Examiner submitted his report (No. 453) February 11, 1933, recommending that each of the applications be granted. No exceptions were filed to the Examiner's report.

### Radio Station WBBM.

Radio Station WBBM-WJBT has been continuously operated since November 19, 1924. The WBBM Broadcasting Corporation, licensee of Station WBBM-WJBT, is shown by the evidence to have assets of $399,534.94, and to be technically capable and otherwise qualified to operate Station WBBM in the public interest.

All of the capital stock of the WBBM Broadcasting Corporation, with the exception of one share, which is held by Mr. Leslie Atlass, as a qualifying share so as to make him eligible to be president of the applicant corporation, is owned by the Columbia Broadcasting System, Inc.

The Columbia Broadcasting System, Inc., is solely dependent on Stations WBBM and WGN as Chicago outlets for its chain programs. Station WBBM is authorized by its license to operate only four-sevenths of the night hours. Under the arrangement between the Columbia Broadcasting System, Inc., and the licensee of Station WGN, the Columbia Broadcasting System may broadcast its programs over Station WGN during the hours of 6:30 p. m. to 8:30 p. m. and 9 p. m. to 9:30 p. m. daily. Because of the limitation on the hours during which Station WBBM may operate and the hours during which the Columbia Broadcasting System may operate its programs over Station WGN, it is impossible for the Columbia Broadcasting System to broadcast many of its programs to the listening audience in and about Chicago, Illinois. The Columbia Broadcasting System has no outlet whatever in Chicago through which it may demand the broadcasting of its programs between the hours of 10 p. m. and 12 p. m.

The programs broadcast by Station WBBM are generally meritorious. This station originates 25 hours or more of programs per week which it furnishes to and which are carried by the Columbia Broadcasting System and its affiliated stations. Station WBBM broadcasts many public service, charitable, civic, religious and patriotic programs free of charge. More than $500,000.00 per year is spent for talent used in the production of programs in the studios of Station WBBM. About one-fourth of this is spent for programs which originate in its studios and are carried by the Columbia network. Approximately $500,000.00 is spent in the operation of Station WBBM for purposes other than for talent.

The transmitting equipment and other associated apparatus employed and used at Station WBBM is of modern design and meets and complies with all the requirements of the Commission. Its studios are of modern design and are completely fitted out with the latest and most modern equipment.

Station WBBM is managed and controlled by executives of wide business experience, particularly in radio broadcasting. Its staff is made up of experienced employees. The employees constituting the program production and broadcasting staff of the station are capable men and women who have had many years experience in the production and broadcasting of radio programs.

767 Splendid programs heretofore originated and offered by the Columbia Broadcasting System could and would have been broadcast by Station WBBM between the hours of 10 p. m. and 12 o'clock midnight, but for the fact that WBBM was and is silent during these hours.

## Radio Station KFAB.

Radio Station KFAB has been continuously operated at Lincoln, Nebraska, since November 8, 1924. The KFAB Broadcasting Company is shown to be in good financial condition. This company is technically and otherwise qualified and capable of and has operated Station KFAB in an acceptable manner and has been broadcasting programs which are generally meritorious. About $50,000.00 per year is spent for talent used in the production of programs of local origin which are broadcast over the station. An additional sum of approximately $50,000.00 per year is spent in the operation of the station for purposes other than for talent.

The transmitting equipment and other apparatus used in the operation of Station KFAB is of modern design and complies with all requirements of the Commission. The studios of this station are equipped with the latest and most modern apparatus.

Station KFAB is managed and controlled by executives who have had broad experience in business and particularly in radio broadcasting. Its operating staff is made up of experienced employees who are capable of operating the station in an acceptable manner. The program and program production staff of the station is likewise comprised of capable men and women experienced in the production and broadcasting of radio programs.

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Tests were made by an experienced radio engineer to determine the reception conditions in the territory intervening between WBBM-WJBT and KFAB. Nighttime measurements made near Des Moines, Iowa, show that severe fading was encountered when listening to either WBBM or KFAB. The field intensity or signal strength of Station WBBM varied over a ratio of 13 to 1, while the field intensity of KFAB faded and fluctuated over a ratio of 12 to 1. This fading on both stations was continuous through all observations made. The service rendered at this point by either of the stations was very poor due to this high ratio of fading, and this fading was made worse by very bad side band fading. The side band fading caused the quality of the reception to be impaired to an exaggerated extent. This was common experience in this territory.

At the point where these observations were made it would have been necessary to make five adjustments of the volume control of a radio receiver during the short period of 27 minutes in order to secure good reception from WBBM, and 8 such adjustments would have been necessary to have secured good reception from KFAB in the short period of 28 minutes. These adjustments would have been necessary on all receivers having manual controls. Only ten to twenty percent of the receivers now in use are equipped with automatic volume control. The majority of the sets which employ automatic volume control are power-operated and therefore cannot be used on many farms. It is common knowledge that the territory intervening between Stations KFAB and WBBM is an agricultural region.

768 From nighttime measurements made at Galesburg, Illinois, the signal from WBBM was observed to fade over a ratio of 350 to 1 which would cause severe fading or changes in loud speaking volume, and no such signal could be said to give satisfactory reception. The fading from WBBM at this point was about as bad as it is possible for fading to be. The signal from Station KFAB was very poor at this same place due to the fading of the carrier wave, and especially due to side band fading.

Tests made in this same general territory in October, 1931, as to the performance of Stations WENR, WMAQ, WGN and WBBM, all of Chicago, disclosed the same general reception conditions existed as to each of them as was later shown by tests to exist with respect to Stations WBBM and KFAB.

Measurements made of Stations WBBM and KFAB at Shenandoah, Iowa, for a period of 18¼ minutes, indicated that the signal of Station WBBM varied, in intensity, over a ratio of 4 to 1, and would have required two or three adjustments of the volume control of a radio receiver to receive or enjoy the program for that station at this place.

Observations made of Station WENR at Shenandoah, and Des Moines, Iowa, show severe fading of the signal from this station.

A radio signal varying in strength, such as that shown to exist at Galesburg, Illinois, could not be handled by a receiver equipped with automatic volume control, and even if a set were capable of handling such a signal, reception would probably be ruined, since local interference and background noise would necessarily be increased in the loud speaker as the radio signal decreased in strength.

The signals or field intensities of Stations WBBM and KFAB were measured within the area between the two stations. Within this area and at points where the desired to the undesired signal is less than 2 to 1, neither station can render high grade service. Since the maximum daylight signal would be .2 millivolt per meter or lower, a low grade of rural service might be rendered, but this would be subject to ruin by man-made interference or inclement weather. Because of the severe fading encountered at night, this poor or low grade service would be severely depreciated.

Within the territory intervening between Stations WBBM and KFAB and where neither can nor does render good service, Station WHO is situated. This station has been authorized to construct and operate a 50 Kw. station. The service which Station WHO would render in this territory would be of a high order and would compare favorably to the service now rendered by KFAB in the vicinity of Lincoln, Nebraska, and the service of WBBM in the vicinity of Chicago, Illinois. Station KMOX, St. Louis, Missouri, operating with 50 Kw., serves a portion of this intervening territory with as high grade service as could be expected from either WBBM or KFAB.

Station WCCO, operating with 50 Kw. at Minneapolis, Minnesota, serves another portion of this intervening territory with as good service as either WBBM or KFAB would be expected to render. Still another station, WMT, Waterloo, Iowa, serves a large portion of this territory. Stations KMOX, WCCO and WMT all carry Columbia programs. Columbia programs are also carried by Stations WBBM and KFAB. A large percentage of listeners within this territory would therefore be able to receive Columbia programs from KMOX, WCCO and WMT if 769 any interference should exist or be caused by the simultaneous synchronized operation of Stations WBBM and KFAB.

The measurements of Station WBBM at Shenandoah, Iowa, and other points represent a fair value of the signal which would ordinarily be expected from a clear channel station at these distances. All clear channel stations are affected by bad fading in certain areas, and the conditions with respect to Station WBBM appear to be representative of the average.

The daytime measurements define the daytime service areas of Stations WBBM and KFAB. These measurement and observations were made for the purpose of drawing certain conclusions, and were used in connection with skywave measurements as one of the means by which the synchronized operation of the two stations might be predicted. Nighttime signal intensities can be fairly and accurately predicted from certain daytime measurements and accepted principles of radio engineering.

Observations were made in the territory intervening between Stations WHO and WOC while operating synchronously and of the conditions and effects of the synchronized operation of Stations WBZ and WBZA. Stations WHO and WOC were located approximately 150 miles apart. When these stations were operated synchronously there was an over-lapping of their ground waves. Due to the high attenuation between Stations WBZ and WBZA there was no over-lapping of the ground waves radiated by these stations, despite their locations. The distance from Station WBBM to Station KFAB is approximately 475 miles. The territory intervening between these stations must depend to a very large extent upon the ground waves for reception from these stations.

The apparatus or equipment which the applicants propose to install and use to carry out this experiment in synchronization is a development of the Bell Telephone Laboratories, which began intense investigation and development of common frequency broadcast work in 1930. This work has been carried on both in the field and in the laboratory, the field work being done in cooperation with the Columbia Broadcasting System. The first installation of the original apparatus developed was at Stations WHO and WOC. The apparatus used by these stations was manually controlled. That which the applicants propose to install will be automatic.

In addition to the experiments conducted at Stations WHO and WOC, the Bell Telephone Laboratories conducted common frequency broadcast control experiments while operating Stations WABC, New York City, WHK, Cleveland, Ohio, and WKBW, Buffalo, New York, simultaneously on a common frequency. The tests conducted while operating these three stations synchronously were made with a more perfected synchronizing system. The results of surveys made in the field while these tests were under way show that the normal service areas of the stations were in no way decreased, nor were their normal service areas decreased when any two of them were operated synchronously.

The apparatus which the applicants propose to install and use to synchronize Stations WBBM and KFAB consists of separate cystal oscillators for each station which are automatically and constantly compared to a 4000-cycle standard frequency supplied to the two stations
770 from a common source. The result of this constant comparison is that the slightest deviation of either station from the standard of comparison causes an automatic compensation to be made to correct the deviation. The proposed equipment will correct an error of one thousandths cycle out of one million cycles per second. A conservative statement of the accuracy with which the equipment may be expected to operate is that the maximum deviation will never exceed one-tenth of one cycle.

Under perfect conditions such as exist in a laboratory, the ratio of the desired to the undesired signal must be 4 to 1 if the stations are operating synchronously and no deterioration in the quality of the desired signal is to be detected. However, under practical operating conditions the signal standard cannot be as perfect as if an experiment were being performed in a laboratory. The ratio necessary between two skywaves for satisfactory reception has not been definitely determined by field measurements. Commission engineers believe that a ratio of 4 to 1 is necessary, while considerable testimony was introduced to the effect that 2 to 1 is sufficient, although it was admitted that this ratio was a comparison of two signals both of which contain much distortion and may not therefore be applied when undistorted reception is available from one station.

It appears that in the territory between Stations WBBM and KFAB there is a certain territory within which neither of the signals of the stations involved (WBBM and KFAB) will be twice as strong as the signal from the other. Under these conditions objectionable interference would result but for the fact that both stations fade so severely and with such rapidity that neither of them renders acceptable service at such time.

Long experience and extended observations in the area between Stations WBBM and KFAB show that average conditions prevail in this territory. If average signals are transmitted by applicant stations during the proposed simultaneous synchronous operation while carrying common programs as contemplated by the applicants, the type of reception with respect to fading will on the average be improved in that area where the signals of each are now seriously impaired. Due to the variable nature of the Heaviside layer and taking into account what is probable, it appears that as the number of stations is increased (operating in synchronism carrying a common program) the probability is that the radiation of a multiplicity of waves to a given or common point is advantageous. This is so because when two or more stations operate on a common frequency and carry a common program they tend to maintain a more constant level of signal strength. This also applies to side-band fading.

Expert information based on observations of the synchronous operation of Stations WHK, WABC and WKBW was to the effect that it is much better to synchronize stations separated by 475 miles, as are applicant stations, than to synchronize stations separated by less than that distance and where their primary service areas over-lap, as is true with respect to the synchronous operation of Stations WTIC and WEAF, and of WBAL and WJZ. It appears that because of the separation between Stations WBBM and KFAB, the synchronous operation of these stations will not affect either the primary or secondary service area of either for the greater portion of the time. This would hold true even if Station KFAB should later operate with 25 kw. instead of 5 kw. as at present, because a ratio of desired to undesired signal as low as 4 to 1 will not exist over a great portion of the time.

771 Considering the law of probabilities and the mathematical formulæ involved, it appears that the average reception and the average program will be better if the two stations in question are operated synchronously than if reception is attempted while only one of the stations is broadcasting.

It is found that if two sine waves (or two radio waves) of equal intensity are received simultaneously the result will be equal to 1.414 times the intensity of either wave. Based on this accepted and accurate mathematical formula, two stations located as Stations WBBM and KFAB are, should produce a resultant field strength, due to skywaves alone, stronger than either one alone.

The applicants propose to install time-delay equipment which will permit of the simultaneous broadcasting of the same program from both stations WBBM and KFAB, regardless of the origin of such program. Such equipment has been developed and is being commercially used. Stations WBBM and KFAB will be directly connected with each other by telephone lines used to carry such programs. Should the time-delay equipment not prove entirely satisfactory, the applicants proposed to use an additional telephone line which will feed the common program to be broadcast by these stations into the trunk line connecting the two at a point midway between the stations. In this way the program to be broadcast by these stations will arrive and be broadcast by them simultaneously. This will tend to prevent simultaneous reception of programs from both of them in certain areas without the undesirable effects which are usually present when a common program might otherwise be broadcast by these two stations and be received so that one program arrives slightly in advance of the other. This produces an objectionable echo effect. This echo effect will be reduced through the use of the time-delay system and apparatus which the applicants propose to install, or in the event that this system does not prove as efficient as it is believed it will prove, this will be offset and taken care of by the use of the feeder line intersecting the trunk line connecting the two stations at a point midway between them.

A much larger number of listeners will be reached and may receive service from Stations WBBM and KFAB when the two are operating synchronously than is possible when only one of the stations is being operated.

The applicants propose to conduct these synchronization tests between the hours of 10 p. m. and midnight. It is common knowledge that during this period of time listeners in rural communities are less numerous than at any other period during the broadcast day. On the other hand, the metropolitan audiences are known to listen regularly to radio programs during these hours. In view of this, it is believed that if any interference whatever is caused by the synchronous operation of these stations, that such interference will occur during such periods of time as to affect the smallest number of listeners.

Since Stations WBBM and KFAB will operate synchronously for only approximately two hours during nighttime, and since only one of the stations will be in operation during the remaining night hours, it will be possible for the applicants or any and all other interested parties to observe the operation of these stations while synchronized and to likewise observe the operation of these stations when only one of them is broadcasting. In this way it will be possible to definitely determine the results of the synchonization tests and make a detailed and complete comparison between the effects produced when only one station is being operated and when the two are being operated synchronously.

772 It appears the applicants herein, if these applications are granted, will have the complete cooperation of the Bell Telephone Laboratories, Inc., one of the outstanding radio engineering organizations of the country. This cooperation will provide the resources of the Bell Laboratories, including equipment and trained development and research engineers who are interested in advancing the art of common frequency broadcasting.

## Grounds for Decision.

On the record in this case the Commission is of the opinion and so finds:

1. The applicants, licensees of Stations WBBM and KFAB, are financially, technically and otherwise qualified to operate Stations WBBM and KFAB in accordance with the applications and to carry on and conduct the experiments and tests which they propose.

2. The programs which Stations WBBM and KFAB would broadcast while synchronized would provide Columbia programs for a large number of listeners who do not now receive these programs in a satisfactory manner from any other broadcasting station.

3. The synchronization experiments proposed by the applicants are materially different from any synchronization experiments heretofore undertaken under practical operating conditions. It is the first complete synchronization experiment proposed to the Commission in which the stations to be synchronized are so separated that the good service area of the stations in question do not overlap.

4. Should any interference result in that territory intervening between Stations WBBM and KFAB, it is reasonable to conclude that other existing stations which broad-

cast the programs of the Columbia Broadcasting System would render as good and acceptable service therein as is possible for either WBBM or KFAB to do while only one of them is being operated. Moreover, the benefit to the great number of people who would receive additional and improved radio reception from the proposed operation would far outweigh any possible adverse effect caused to listeners by such operation.

5. The training and experience as well as the financial resources which will be available give assurance that these experiments will be conducted in the most modern, thorough and scientific manner and will add considerable to existing knowledge on the subject of common frequency broadcasting. It appears that these tests would be conducted in such a way as to prove the practicability or impracticability of common frequency broadcasting under practical operating conditions. This proof is of importance in the advancing science of radio broadcasting.

6. The making and conducting of the synchronization experiments proposed by the applicants because of the data and facts which would be gathered therefrom, are of such importance to the art of radio broadcasting that public interest, convenience and necessity would be served by the granting of these applications.

773-831 *Order.*

On consideration of the evidence in this case and the Examiner's Report, it is accordingly ordered:

1. That the applications of WBBM Broadcasting Corporation for authority to install automatic frequency control and for modification of station license to synchronize with Station KFAB during certain specified night hours be, and the same is hereby, granted experimentally, and

2. That the applications of KFAB Broadcasting Company for authority to install automatic frequency control and for modification of station license to synchronize with Station WBBM during certain specified night hours be, and the same is hereby, granted, experimentally.

Starbuck, Commissioner, dissenting.

Filed March 24, 1933.

* * * * * * *

832 Document attached as exhibit to WBBM Broadcasting Company's "Demurrer to Protest and Motion for Reconsideration."

*Affidavit of Frank B. Falknor.*

DISTRICT OF COLUMBIA,
*City of Washington, ss:*

Frank B. Falknor, after being first duly sworn according to law, on oath deposes and says:

1. That affiant was present in the hearing room of the Federal Radio Commission in the Interior Department Building in Washington, D. C. on Monday, November 14, 1932, when the hearing before Chief Examiner Ellis A. Yost, of the Federal Radio Commission, opened on the applications of the WBBM Broadcasting Corporation and KFAB Broadcasting Company bearing the Commission's Docket Nos. 1668 and 1669, and Docket Nos. 1670 and 1671.

2. That on Monday, November 14, 1932, Arthur W. Scharfeld, who was then and who still is associated with L. G. Caldwell, and who made oath to the "Supplement to Protest and Motion for Reconsideration" filed by WGN, Inc. in connection with the applications referred to in paragraph numbered 1 hereof, as "one of the attorneys and *duly authorized representatives of WGN, Inc.*", was present in said hearing room and talked to affiant about and in connection with the applications referred to above and then being heard.

3. That affiant has been employed as a radio engineer by the licensee of Radio Station WGN prior to November 14, 1932, and has testified at hearings to which the licensee of Station WGN was a party and at hearings at which the licensee of Station WGN was represented by L. G. Caldwell and those directly associated with him, including Arthur W. Scharfeld.

4. That it is common knowledge that L. G. Caldwell and those associated with him, including Arthur W. 833-877 Scharfeld, have continuously been "the attorneys and duly authorized representatives of WGN, Inc." ever since the transfer of the station license of Station WGN from The Tribune Company to WGN, Inc. on the 4th day of March, 1932.

5. That it is common knowledge that L. G. Caldwell and those directly associated with him, including Arthur W. Scharfeld, were the "attorneys and duly authorized representatives" of The Tribune Company as licensee of Radio Station WGN for a long period prior to March 4, 1932.

6. That to affiant's own personal knowledge the said Arthur W. Scharfeld, "one of the attorneys and duly authorized representatives of WGN, Inc." had actual knowledge of the pendency of the applications of the WBBM Broadcasting Corporation and KFAB Broadcasting Company, referred to in paragraph numbered 1 hereof, and of the hearing being held on and in connection with said applications before Chief Examiner Ellis A. Yost of the Federal Radio Commission, the said Arthur W. Scharfeld, "one of the attorneys and duly authorized representatives of WGN, Inc." having engaged affiant in conversation, as aforesaid, about and with respect to said applications bearing the Commission's docket numbers hereinbefore recited.

FRANK B. FALKNOR.

Subscribed and sworn to before me this the 8th day of April, A. D. 1933.

[Seal of Margaret S. Jarvis, Notary Public, District of Columbia.]

MARGARET S. JARVIS,
*Notary Public.*

* * * * * * *

878 & 879 (*Newspaper Clipping Annexed to "Demurrer to Protest and Motion for Reconsideration."*)

Document attached is exhibit to WBBM's "Demurrer to Protest and Motion for Reconsideration".

### Seek Synchronization.

A proposal has been made to the federal radio commission to synchronize WBBM, Chicago, and KFAB, Lincoln, Neb., which now share a clear channel, with the idea that they may both secure full time on the air.

* * * * * * *

880 In the Court of Appeals of the District of Columbia.

No. 5939.

WGN, INCORPORATED, Appellant,

v.

FEDERAL RADIO COMMISSION.

*Certificate of Herbert L. Pettey, Secretary of the Federal Radio Commission.*

I, Herbert L. Pettey, Secretary of the Federal Radio Commission, do hereby certify that the attached are originals or true and correct copies of all papers and evidence presented to the Federal Radio Commission upon the matter involved in the above entitled cause, and also attached hereto is a true and correct copy of the Statement of Facts, Grounds for Decision, and Order of the Commission in the matter of the applications of WBBM Broadcasting Corporation (WBBM) for modification of license and authority to install automatic frequency control, and the applications of KFAB Broadcasting Company (KFAB) for modification of license and authority to install automatic frequency control.

Witness my hand and the seal of the Federal Radio Commission this 11th day of May, 1933.

[Seal U. S. Federal Radio Commission.]

HERBERT L. PETTEY,
*Secretary.*

881 In the Court of Appeals of the District of Columbia.

No. 5939.

WGN, INC., Appellant,

v.

FEDERAL RADIO COMMISSION, Appellee.

*Stipulation to Designate Portions of Record for Printing.*

It is hereby stipulated by counsel for the respective parties in the above entitled cause that the transcript of evidence heard at the hearing before Chief Examiner Yost November 14 to 17, 1932, may be omitted from the printed record, excepting only the page or pages showing the parties present and/or represented at said hearing.

In view of such omission, it is further stipulated that in all proceedings henceforth had on this appeal appellant will confine itself to the reasons for appeal set forth in paragraphs numbered 1 to 4 contained in its Notice of Appeal under the heading "Reasons for Appeal," it being understood that, in so doing, appellant reserves all rights it may have to urge any and all other points in any proceedings which may be had before the Commission as a result of this appeal.

It is further stipulated that, in agreeing to the inclusion of the following documents in the printed record, appellant reserves the right to contend that such documents are not properly a part of the record in this cause and should not have been included in the papers filed by the Federal Radio Commission in this cause.

882 In view of the foregoing, it is further stipulated that the clerk print the portions of the record which are listed below:

Pages 1 to 36 (Notice of Appeal).

Page 37 not marked for omission.

Pages 38-41 (Notice of Intention to Intervene).

Page 42 (Statement of Filing of Record).

Pages 47 to 49 inclusive (Application of WBBM).

Pages 50 to 54 inclusive (Application to install frequency control).

Pages 61 to 62 inclusive.

Pages 63 to 67 inclusive (Application of KFAB).

Pages 79 to 80 inclusive (Application of KFAB).

Page 81, not marked for omission (Report of Broadcasting applications).

Page 83 (Minute Entry No. 550).

Page 84 not marked for omission (Press Release).

Page 87 not marked for omission (Press Release).

Pages 88 to 90 (Notice of Hearing to WBBM).

Pages 91 to 93 (Notice of Hearing to KFAB).

Pages 94 to 95 (WBBM—Statement of Facts to be Proved).

Pages 96 to 98 (KFAB—Statement of Facts to be Proved).

Page 103 (Calendar of Hearings).

Pages 106-108 incl. not marked for omission (Parties represented at Hearing).

Pages 748 to 763 (Examiner's Report).

Page 764 (Letter from Mr. Masters).

Pages 765 to 773 (Commission's Statement of Facts and Grounds for Decision).

Pages 832-833 (Affidavit attached to Document entitled "Demurrer to Protest and Motion for Reconsideration").

883 Page 878 (Newspaper clipping annexed to "Demurrer to Protest and Motion for Reconsideration").

Page 880 (Certificate of Secretary).

This stipulation.

ARTHUR W. SCHARFELD,
*Counsel for Appellant, WGN, Inc.*
GEORGE B. PORTER,
*Counsel for Federal Radio Commission.*
PAUL D. P. SPEARMAN,
*Counsel for Interveners (WBBM and KFAB).*

884 [Endorsed:] No. 5939. In the Court of Appeals of the District of Columbia. WGN, Inc., appellant, v. Federal Radio Commission, appellee. Stipulation to designate Portions of Record for Printing. Kirkland, Fleming, Green & Martin, 914 National Press Building, Washington, D. C. Louis G. Caldwell, Resident Partner. Court of Appeals, District of Columbia. Filed Jun. 24, 1933. Henry W. Hodges, Clerk.

Endorsed on cover: Federal Radio Commission. No. 5939. WGN, Inc., appellant, vs. Federal Radio Commission. Court of Appeals, District of Columbia. Filed Apr. 13, 1933. Henry W. Hodges, Clerk.

COURT OF APPEALS
DISTRICT OF COLUMBIA
FILED

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Henry W. Hodges
CLERK

## No. 5939

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# In the Court of Appeals of the District of Columbia

WGN, Inc., appellant
*v.*
Federal Radio Commission

**BRIEF ON BEHALF OF THE FEDERAL RADIO COMMISSION**

**GEORGE B. PORTER,**
*Acting General Counsel.*
**FANNEY NEYMAN,**
*Assistant Counsel.*

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# In the Court of Appeals of the District of Columbia

No. 5939

WGN, Inc., appellant
*v.*
Federal Radio Commission

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## BRIEF ON BEHALF OF THE FEDERAL RADIO COMMISSION

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## I

### STATEMENT

This is an appeal under Section 16 of the Radio Act of 1927, as amended July 1, 1930 (46 Stat. 844) from a decision of the Federal Radio Commission filed March 24, 1933, granting the applications of WBBM Broadcasting Company (Station WBBM) and KFAB Broadcasting Company (Station KFAB), for modification of license so as to *experiment with synchronization certain night hours* (R. 95-106).

On March 30, 1932, there were received at the offices of the Federal Radio Commission two applications dated March 24, 1932, one from WBBM Broadcasting Company operating Station WBBM at Chicago, Illinois, and one from KFAB Broadcasting Company operating Station KFAB at Lincoln, Nebraska, seeking modifications of their existing licenses so as to permit both to operate *in synchronization* during specified night hours (R. 43–57 incl.).

Stations WBBM and KFAB are both licensed for the use of 770 kc, the former with 25 kw, the latter, 5 kw power. Prior to the grant complained of Station WBBM operated daytime hours simultaneously with KFAB and *shared* time at night with Station KFAB in the following proportion: WBBM 4/7ths time, KFAB 3/7ths time. The grant in question affected night hours only insofar as WBBM was authorized to operate *in synchronization experimentally* with Station KFAB during its 3/7ths time operation, from 10 to 12 o'clock midnight C.S.T.

The issue raised by this appeal relates solely to these hours.

The Commission was unable to determine from an examination of the applications involved herein that public interest, convenience, and necessity would be served by the granting thereof, and in accordance with Section 11 of the Radio Act of 1927, as amended (44 Stat. 1167), designated them for public hearing before an examiner regularly appointed by the Commission (R. 58).

Notice in writing was given to the applicants and other stations on adjacent frequencies whose interest was apparent in that their service might be affected by the requested operation, if granted. The notice stated that the applications therein described were designated for hearing for the following reasons:

(1) To determine whether interference will be produced by the operation of WBBM and KFAB, as proposed by the applicant;

(2) To determine what effect said interference, if produced, will have upon the service of the stations involved, particularly in the rural service area;

(3) To determine whether the public interest, convenience and/or necessity would be served by authorizing these stations to operate in synchronism upon the clear channel frequency now authorized—namely, 770 kc., and whether said stations should be granted regular or experimental authorizations;

(4) To determine the effect of synchronization, if authorized, particularly as to frequency maintenance and modulation, quota charges to be made and reception to the public in the areas of the station, such as the good, 'mush' and long distance rural areas;

(5) To determine whether the applications may be granted, in view of the provisions of Section 9 of the Radio Act of 1927, as amended by the Act of March 28, 1928, and the Commission's regulations pursuant thereto;

(6) To determine the need for additional service in the immediate area now served by these stations and whether any service will be deprived to listeners in their normal service areas;

(7) To determine whether public interest, convenience and/or necessity would be served by the granting of the applications.

(R. 59, 60; 62, 63).

Appellant, WGN, Inc., owns and operates Station WGN at Chicago, Ill. This station is licensed for the use of 720 kc, full time, with 25-kw power.

The frequency separation between Station WGN and WBBM is 50 kc. This is generally recognized as adequate, and there is no question of interference between the two stations involved in this appeal.

Synchronization is the operation of two stations upon the same frequency, simultaneously, and with identical programs. It is a type of service not as yet regularly recognized by the Federal Radio Commission for the reason that it is a comparatively new discovery in radio science, and no sufficient basis has as yet been presented to the Commission, as a result of experiments conducted, which would justify such recognition.

No notice in writing of the designation for hearing of the applications of Stations WBBM and KFAB for modification of license so as to permit operation in synchronization during certain night hours was given Station WGN for the reasons that said applications raised no question of interference between applicants' stations and appellant's station WGN, and no questions of quota were involved since synchronization is not a service regularly recognized by the Commission.

However, in cases such as the instant one, where notice in writing is sent only to stations having an apparent interest in the applications under consideration, the Commission provides a means whereby any other station that considers itself interested in any way may come in, show its interest, and participate in any hearing either in support of or in opposition to any application. Paragraph 59 of the Rules of the Commission provides for intervention at any time more than 10 days prior to the date of any hearing, in support of or in opposition to, any application designated for hearing, by any person, firm, company, or corporation. The Commission maintains a service whereby a daily report of broadcasting applications received is made public at its offices, and mailed to all stations requesting this service (R. 57). In like manner, the calendar of all hearings on all applications is made public as they are scheduled (R. 68), as is a report of Commission action upon all applications received (R. 58).

On November 14, 1932, a public hearing was held before the Chief Examiner appointed by the Commission, on the applications of Stations WBBM and KFAB for modification of license to operate in synchronization.

Thereafter the Examiner made his report recommending that the applications for modification of license so as to authorize experimental synchronous operation of Stations WBBM and KFAB be granted (R. 94).

On March 24, 1933, the Commission (Starbuck, Commissioner, dissenting) filed its Statement of Facts, Grounds for Decision and Order, granting the applications herein involved for synchronous operation upon an experimental basis (R. 95 to 106, incl.).

On March 27, 1933, a protest was received from appellant by its counsel to the granting of the applications herein, which said protest was based almost entirely upon the question of quota (R. 5 to 12, incl.). Appellant also filed a supplemental protest and motion for reconsideration, both of which were rejected by the Commission (R. 12–14). This appeal followed.

## II

## ARGUMENT

### A. On the motion to dismiss

#### 1. Appellant has no appealable interest

Section 16 of the Radio Act of 1927 as amended July 1, 1930 (46 Stat. 844) provides in part:

> (a) An appeal may be taken in the manner hereinafter provided from decisions of the Commission to the Court of Appeals of the District of Columbia in any of the following cases:
>
> * * * * *
>
> (3) By any other person, firm, or corporation *aggrieved* or whose *interests are adversely affected* by any decision of the Commission granting or revoking any such application or by any decision of the Commission revoking, modifying, or suspending an existing station license (italics supplied).
>
> * * * * *

Appellant states that it is "aggrieved" and its "interests adversely affected" as follows:

> (a) By subjecting appellant, as well as all other owners of existing stations, in Illinois

> and particularly in Chicago, to increased danger of loss or reduction of facilities now enjoyed by them through the operation of the Davis Amendment and of the Commission's regulations made pursuant thereto;
>
> (b) By placing an additional obstacle in the way of appellant, as well as all other owners of existing Chicago stations, securing facilities which will give increased broadcast service to rural listeners as distinguished from urban listeners located in Chicago or its immediate vicinity;
>
> (c) By subjecting appellant, as well as all other owners of existing Chicago stations, to diminution of revenue, through the allocation of additional facilities in Chicago.

(R. 2.)

### (A) SYNCHRONIZATION IS NOT A RECOGNIZED SERVICE AND EXPERIMENTAL GRANTS SO MADE ARE NOT CHARGED TO QUOTA

Rule 109 F quoted by appellant (page 7 of its brief) refers to experimental grants in recognized services. Services such as synchronization not yet recognized by the Commission are *not charged to quota.*

One of the reasons for designating the applications for hearing was to determine if possible whether sufficient progress had been made in the art to recognize synchronization as a regular service or whether it should be granted experimentally or at all.

### (B) WGN ALREADY OCCUPIES A CLEAR CHANNEL FREQUENCY WITH UNLIMITED HOURS OF OPERATION. THE ONLY INCREASE IN FACILITIES WHICH IT CAN SEEK IN THE FUTURE IS INCREASE IN POWER

Under the provisions of Paragraph 109 of the Commission's Rules, the quota charge of 5 units for appellant's station remains constant, irrespective of any increase in power which may be granted. The quota situation with reference to the State of Illinois and the Fourth Zone in which it is located is not, therefore, in question in this appeal.

Appellant states (Brief page 17) that "the granting of the WBBM application will increase broadcast service for the supposedly over-served Chicago listeners *at the expense of the rural listeners*." This is not a fact. The granting of the WBBM application can not possibly affect rural listeners. It did not take anything away from any other station. The effect of the grant is to give two additional hours of programs to Chicago, but this is incidental, the Commission's consideration being the carrying out of practical experiments in synchronization under ideal conditions, *which will not reduce the consistent service of either participating station*, but which may be of great benefit to the listening public.

### (C) APPELLANT HAS NO SUBSTANTIAL ECONOMIC INTEREST IN INTERVENERS' APPLICATIONS WHICH HAS BEEN ADVERSELY AFFECTED BY THE GRANTING THEREOF

We do not agree with appellant that "the nature of its economic interest is self-evident from the fact that both WGN and WBBM are located in the same community and compete for the same listening public and the same advertisers" (appellant's brief, p. 10). The fact that the stations are in the same community and serve the same listening public, does not necessarily mean that they compete for the same advertisers. Under some circumstances, this *might* be so, but in the case at bar, the stations are located in and are serving the *second largest city in the United States, and one of the greatest business centers in the world.* Although Chicago and vicinity has more than the assigned quota of broadcast facilities to which it is entitled under the Radio Act of 1927, as amended, and the number of stations it may have is thereby limited, *there is no limit upon business enterprise of this great metropolitan center.* It is common knowledge that the amount of business available in Chicago is far greater than can be taken care of by the existing stations, and it is absurd to say that the addition of two night hours will result in injury to or necessitate any deterioration of the program service to the public by any existing Chicago station.

Appellant further contends that it has an economic interest in the addition of any service to Chicago because of the possibility of competition, and hence it should have been notified of the hearing on the applications of Stations WBBM and KFAB. If this is true, then every time any service is added to any community for whatever reason, every other station in the locality must be notified. In the case at bar, for instance, under appellant's contention, the Commission would have had to notify every station in Chicago and vicinity. We do not believe that the spirit or letter of the Radio Act of 1927, as amended, require the Commission to undertake this immense burden upon a *mere apprehension* that any of them may be interested.

Insofar as the contract is concerned, to which interveners make reference in their Opposition to Appellant's Petition for Stay, referred to by appellant as an "admission of its (appellant's) interest" (brief, pages 15 and 16), that is purely a private matter between the parties involved and was not before the Commission at the time it designated the applications of WBBM and KFAB for public hearing. Moreover, the Commission is not bound by any admission made by interveners.

The cases cited by the appellant with reference to public utilities are not in point here because, in the first place, a broadcast station is not a public utility, and, in the second place, there is no unnecessary duplication of service as suggested by appellant. The principle established by the Commission in the case of *Great Lakes Broadcasting Company* v. *Federal Radio Commission*, Record No. 4900 (59 App.D.C. 197), quoted by appellant, page 15 of its brief, is not applicable here because WBBM and KFAB are not newcomers in the field and *the service of appellant is not being destroyed to make room for them.*

Appellant's claim of interest is much too unsubstantial to come within the statute herein. The damage or grievance which entitles a party to appeal must be a direct and possible one affected by the decision concluding and acting upon his rights. *Edward Hines Yellow Pines, Trustee,* v. *U.S.,* 263 U.S. 143; *In re Deseret Mortuary Co.,* 3 P. (2d) 267; *Moffat Tunnel League* v. *U.S.,* — U.S. —, 53 S.Ct. 543, decided April 10, 1933; *The Telegraph Herald Company* v. *Federal Radio Commission,* — App.D.C. —, 66 F. (2d) 220.

The question of interest is a jurisdictional one, and appellant must affirmatively show that it has such an interest as is contemplated by the statute before he can appeal thereunder (52 Ruling Case Law, 52, 53).

The right to appeal to this court from any decision of the Commission is statutory and must be strictly construed. *Universal Service Wireless Company* v. *Federal Radio Commission,* 59 App.D.C. 319.

### 2. The order complained of is not a final order and, therefore, not appealable

It is fundamental that no appeal will lie as a matter of right from an interlocutory order. *Trans-Atlantic Trust Company* v. *Pagenstecher,* 53 App.D.C. 42; *Mellon* v. *Mertz,* 58 App.D.C. 302.

The Order herein sought to be appealed from is not a final Order. It is a conditional *EXPERIMENTAL* authorization. It authorizes Stations WBBM and KFAB to use the time from ten to twelve o'clock P.M., for the purpose of *experimenting* in synchronization.

This Court may take judicial notice of the fact that radio broadcasting is in a formative state. It is a progressive art which crystallizes through experimentation. Under the Radio Act of 1927, as amended, a necessary preliminary to the carrying on of experimental work in the broadcast band is obtaining authorization from the licensing authority. Such authorization is manifestly conditional and can only be made final and absolute upon application together with proof of success of the experiment. At such time as application is made for regular operation of WBBM in synchronization with KFAB, appellant will have an opportunity to present to the Commission any objections it may care to make. If the Commission should grant such an application, the appellant, if it has an appealable interest, will have twenty days within which to appeal from any such decision or order.

## B. The merits

### 1. The Commission did not err in granting the applications in question without notice to appellant

Interveners' applications requested a type of service not regularly recognized by the Commission, and upon a frequency which would not affect the physical operation of appellant's station. As has also already been pointed out, no questions of quota were involved. Appellant contends it has an economic interest which is adversely affected by the granting of said applications, which we deny. (See brief, pages 8–10 incl.)

While it is nearly always possible, because of existing empirical standards known to radio science, for the Commission to determine from an examination of any application whether the granting thereof would adversely affect the physical operation of any other station, this is not true insofar as the granting thereof will affect other stations, from an economic standpoint, where many indeterminate elements may exist. In cases like the present, where no substantial economic interest to any existing station is apparent, the Commission does not provide specific written notice but has established a procedure whereby any such station considering itself interested may participate in the hearing on any such application. This procedure is set out in detail on pages 4 and 5 of this brief and need not be repeated here. Appellant did not see fit to avail itself of this opportunity, and we respectfully submit that the Commission was not in error in granting the applications in question without specific notice to appellant and its participation in the hearing.

### 2. The Commission may authorize experiments where public interest, convenience, and necessity will be served, although such authorization secondarily results in additional program service to an area which already has its quota

The applications complained of were not granted for the purpose of adding to the program service of Chicago as appellant would have the court believe. The necessary effect of the grant incidentally did result in adding two nighttime hours to Chicago, and because the Commission knew the grant would have this result, it considered the fact that the service offered *was not duplicated by any other Chicago station.* The primary reason, however, for granting these applications was to provide the necessary authority for carrying out practical experiments in a new phase of radio science which is highly technical and may be of tremendous importance to the people of the United States, if not, indeed, the entire world. The additional program service complained of was a necessary incident to the carrying out of these experiments. The Commission is continually striving to obtain better usage of the limited number of frequencies available for broadcasting, so that more and better service can be rendered the listening public. Of the several technical developments effecting improvements in this regard, synchronization has been considered one of the foremost possibilities. Some experimental grants have been made, and valuable data collected as a result, but further experiments are necessary as the potentialities of this service become apparent. Up to the present time, very little commercial application has been made, and the experiments at hand for the purpose of determining whether or not such operation is feasible, are meager. In the case at bar, the stations are ideally separated so that there is no interference between the ground waves of the two stations (R. 83). The Commission has not heretofore authorized experiments under such conditions. The territory in which the stations are located has much better propagation characteristics than that of the territories in which experiments have been conducted heretofore. The technical apparatus to be used in the case at bar is different in certain respects from any heretofore used (R. 102), and the possibilities of determining from actual commercial usage, under substantially ideal conditions, the feasibility of synchronization as a practical matter, were of the best. If this experiment proves successful, and the Commission should determine that the results justify their application completely in the allocation of frequencies to broadcasting stations, a reallocation of broadcasting facilities will be in order. Its possibilities are far-reaching, and the Commission is taking it slowly.

It cannot be doubted that the Commission has this power.

## III

### CONCLUSION

For the reasons herein set forth, it is respectfully submitted that the Commission's decision should be affirmed.

Federal Radio Commission,
By George B. Porter,
*Acting General Counsel.*
Fanney Neyman,
*Assistant Counsel.*

U.S. GOVERNMENT PRINTING OFFICE: 1933